**3GPP TSG-RAN WG2 Meeting #117-e R2-22xxxxx**

**Online, 21 Feb – 3 Mar 2022**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **38.331** | **CR** | **2921** | **rev** | **1** | **Current version:** | **16.7.0** |  |
|  |
| *For* [***HELP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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|  |
| ***Title:***  | NR RRC CR for RAN slicing |
|  |  |
| ***Source to WG:*** | Huawei, HiSilicon |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | NR\_Slice-Core |  | ***Date:*** | 2022-03-01 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | Introduction of RAN slicing enhancements for NR. |
|  |  |
| ***Summary of change:*** | The following changes are made:1) add slice based cell reselection priorities into SIB and RRCRelease messages2) add rach prioritization information for slicing into the fields RACH config common and RACH config common for two step RA |
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| ***Consequences if not approved:*** | RAN slicing enhancements for NR are not supported. |
|  |  |
| ***Clauses affected:*** | [To be updated] |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 38.300 CR0413TS 38.304 CR0235TS 38.321 CR1190 |
| ***affected:*** |  | **X** |  Test specifications |  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications |  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

### 5.2.2 System information acquisition

#### 5.2.2.1 General UE requirements



Figure 5.2.2.1-1: System information acquisition

The UE applies the SI acquisition procedure to acquire the AS, NAS- and positioning assistance data information. The procedure applies to UEs in RRC\_IDLE, in RRC\_INACTIVE and in RRC\_CONNECTED.

The UE in RRC\_IDLE and RRC\_INACTIVE shall ensure having a valid version of (at least) the *MIB*, *SIB1* through *SIB4,* *SIB5* (if the UE supports E-UTRA), *SIB11* (if the UE is configured for idle/inactive measurements), *SIB12* (if UE is capable of NR sidelink communication and is configured by upper layers to receive or transmit NR sidelink communication), and *SIB13*, *SIB14* (if UE is capable of V2X sidelink communication and is configured by upper layers to receive or transmit V2X sidelink communication), SIBXX (if the UE is configured for slice specific cell reselection information).

The UE shall ensure having a valid version of the posSIB requested by upper layers.

*<Next modification>*

##### 5.2.2.4.3 Actions upon reception of *SIB2*

Upon receiving *SIB2*, the UE shall:

1> if in RRC\_IDLE or in RRC\_INACTIVE or in RRC\_CONNECTED while T311 is running:

2> if, for the entry in *frequencyBandList* with the same index as the frequency band selected in clause 5.2.2.4.2, the UE supports at least one *additionalSpectrumEmission* in the *NR-NS-PmaxList* within the *frequencyBandList*:

3> apply the first listed *additionalSpectrumEmission* which it supports among the values included in *NR-NS-PmaxList* within *frequencyBandList*;

3> if the *additionalPmax* is present in the same entry of the selected *additionalSpectrumEmission* within *NR-NS-PmaxList*:

4> apply the *additionalPmax*;

3> else:

4> apply the *p-Max*;

3> if the UE selects a frequency band (from the procedure in clause 5.2.2.4.2) for the supplementary uplink:

4> if, for the entry in *frequencyBandListSUL* with the same index as the frequency band selected in clause 5.2.2.4.2, the UE supports at least one *additionalSpectrumEmission* in the *NR-NS-PmaxList* within the *frequencyBandListSUL*:

5> apply the first listed *additionalSpectrumEmission* which it supports among the values included in *NR-NS-PmaxList* within *frequencyBandListSUL*;

5> if the *additionalPmax* is present in the same entry of the selected *additionalSpectrumEmission* within *NR-NS-PmaxList*:

6> apply the *additionalPmax*;

5> else:

6> apply the *p-Max*;

4> else:

5> apply the *p-Max.*

2> else:

3> apply the *p-Max*;

##### 5.2.2.4.4 Actions upon reception of *SIB3*

No UE requirements related to the contents of this *SIB3* apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

##### 5.2.2.4.5 Actions upon reception of *SIB4*

Upon receiving *SIB4* the UE shall:

1> if in RRC\_IDLE, or in RRC\_INACTIVE or in RRC\_CONNECTED while T311 is running:

2> for each entry in the *interFreqCarrierFreqList*:

3> select the first frequency band in the *frequencyBandList*, and *frequencyBandListSUL*, if present, which the UE supports and for which the UE supports at least one of the *additionalSpectrumEmission* values in *NR-NS-PmaxList*, if present:

3> if, the frequency band selected by the UE in *frequencyBandList* to represent a non-serving NR carrier frequency is not a downlink only band:

4> if, for the selected frequency band, the UE supports at least one *additionalSpectrumEmission* in the *NR-NS-PmaxList* within the *frequencyBandList*:

5> apply the first listed *additionalSpectrumEmission* which it supports among the values included in *NR-NS-PmaxList* within *frequencyBandList*;

5> if the *additionalPmax* is present in the same entry of the selected *additionalSpectrumEmission* within *NR-NS-PmaxList*:

6> apply the *additionalPmax*;

5> else:

6> apply the *p-Max*;

5> if *frequencyBandListSUL is present in SIB4* and, for the frequency band selected in *frequencyBandListSUL*, the UE supports at least one *additionalSpectrumEmission* in the *NR-NS-PmaxList* within *FrequencyBandListSUL*:

6> apply the first listed *additionalSpectrumEmission* which it supports among the values included in *NR-NS-PmaxList* within *frequencyBandListSUL*;

6> if the *additionalPmax* is present in the same entry of the selected *additionalSpectrumEmission* within *NR-NS-PmaxList*:

7> apply the *additionalPmax*;

6> else:

7> apply the *p-Max*;

5> else:

6> apply the *p-Max*;

4> else:

5> apply the *p-Max*;

1> if in RRC\_IDLE or RRC\_INACTIVE, and T331 is running:

2> perform the actions as specified in 5.7.8.1a;

*<Next modification>*

##### 5.2.2.4.14 Actions upon reception of *SIB13*

Upon receiving *SIB13*, the UE shall perform the actions upon reception of *SystemInformationBlockType21* as specified in 5.2.2.28 in TS 36.331 [10].

##### 5.2.2.4.15 Actions upon reception of *SIB14*

Upon receiving *SIB14*, the UE shall perform the actions upon reception of *SystemInformationBlockType26* as specified in 5.2.2.33 in TS 36.331 [10].

##### 5.2.2.4.xx Actions upon reception of *SIBxx (FFS)*

Upon receiving *SIBxx* with cell reselection priorities for slicing, the UE shall perform the actions as specified in subclause in TS 38.304 [20].

*<Next modification>*

### 5.3.8 RRC connection release

#### 5.3.8.1 General



Figure 5.3.8.1-1: RRC connection release, successful

The purpose of this procedure is:

- to release the RRC connection, which includes the release of the established radio bearers, BH RLC channels as well as all radio resources; or

- to suspend the RRC connection only if SRB2 and at least one DRB or, for IAB, SRB2, are setup, which includes the suspension of the established radio bearers.

#### 5.3.8.2 Initiation

The network initiates the RRC connection release procedure to transit a UE in RRC\_CONNECTED to RRC\_IDLE; or to transit a UE in RRC\_CONNECTED to RRC\_INACTIVE only if SRB2 and at least one DRB or, for IAB, SRB2, is setup in RRC\_CONNECTED; or to transit a UE in RRC\_INACTIVE back to RRC\_INACTIVE when the UE tries to resume; or to transit a UE in RRC\_INACTIVE to RRC\_IDLE when the UE tries to resume. The procedure can also be used to release and redirect a UE to another frequency.

#### 5.3.8.3 Reception of the *RRCRelease* by the UE

The UE shall:

1> delay the following actions defined in this sub-clause 60 ms from the moment the *RRCRelease* message was received or optionally when lower layers indicate that the receipt of the *RRCRelease* message has been successfully acknowledged, whichever is earlier;

1> stop timer T380, if running;

1> stop timer T320, if running;

1> if timer T316 is running;

2> stop timer T316;

2> clear the information included in *VarRLF-Report,* if any;

1> stop timer T350, if running;

1> if theAS security is not activated:

2> ignore any field included in *RRCRelease* message except *waitTime*;

2> perform the actions upon going to RRC\_IDLE as specified in 5.3.11 with the release cause 'other' upon which the procedure ends;

1> if the *RRCRelease* message includes *redirectedCarrierInfo* indicating redirection to *eutra*:

2> if *cnType* is included:

3> after the cell selection, indicate the available CN Type(s) and the received *cnType* to upper layers;

NOTE 1: Handling the case if the E-UTRA cell selected after the redirection does not support the core network type specified by the *cnType,* is up to UE implementation.

2> if *voiceFallbackIndication* is included:

3> consider the RRC connection release was for EPS fallback for IMS voice (see TS 23.502 [43]);

1> if the *RRCRelease* message includes the *cellReselectionPriorities* or *freqPriorityListNRForSlicing*:

2> store the cell reselection priority information provided by the *cellReselectionPriorities* or *freqPriorityListNRForSlicing*;

2> if the *t320* is included:

3> start timer T320, with the timer value set according to the value of *t320*;

1> else:

2> apply the cell reselection priority information broadcast in the system information;

1> if *deprioritisationReq* is included and the UE supports RRC connection release with deprioritisation:

2> start or restart timer T325 with the timer value set to the *deprioritisationTimer* signalled;

2> store the *deprioritisationReq* until T325 expiry;

NOTE 1a: The UE stores the deprioritisation request irrespective of any cell reselection absolute priority assignments (by dedicated or common signalling) and regardless of RRC connections in NR or other RATs unless specified otherwise.

1> if the *RRCRelease* includes the *measIdleConfig*:

2> if T331 is running:

3> stop timer T331;

3> perform the actions as specified in 5.7.8.3;

2> if the *measIdleConfig* is set to *setup*:

3> store the received *measIdleDuration* in *VarMeasIdleConfig*;

3> start timer T331 with the value set to *measIdleDuration*;

3> if the *measIdleConfig* contains *measIdleCarrierListNR*:

4> store the received *measIdleCarrierListNR* in *VarMeasIdleConfig*;

3> if the *measIdleConfig* contains *measIdleCarrierListEUTRA*:

4> store the received *measIdleCarrierListEUTRA* in *VarMeasIdleConfig*;

3> if the *measIdleConfig* contains *validityAreaList*:

4> store the received *validityAreaList* in *VarMeasIdleConfig*;

1> if the *RRCRelease* includes *suspendConfig*:

2> apply the received *suspendConfig*;

2> remove all the entries within *VarConditionalReconfig*, if any;

2> for each *measId*, if the associated *reportConfig* has a *reportType* set to *condTriggerConfig*:

3> for the associated *reportConfigId*:

4> remove the entry with the matching *reportConfigId* from the *reportConfigList* within the *VarMeasConfig*;

3> if the associated *measObjectId* is only associated to a *reportConfig* with *reportType* set to *condTriggerConfig*:

4> remove the entry with the matching *measObjectId* from the *measObjectList* within the *VarMeasConfig*;

3> remove the entry with the matching *measId* from the *measIdList* within the *VarMeasConfig*;

2> reset MAC and release the default MAC Cell Group configuration, if any;

2> re-establish RLC entities for SRB1;

2> if the *RRCRelease* message with *suspendConfig* was received in response to an *RRCResumeRequest* or an *RRCResumeRequest1*:

3> stop the timer T319 if running;

3> in the stored UE Inactive AS context:

4> replace the KgNB and KRRCint keys with the current KgNB and KRRCint keys;

4> replace the C-RNTI with the C-RNTI used in the cell (see TS 38.321 [3]) the UE has received the *RRCRelease* message;

4> replace the *cellIdentity* with the *cellIdentity* of the cell the UE has received the *RRCRelease* message;

4> replace the physical cell identitywith the physical cell identity of the cell the UE has received the *RRCRelease* message;

2> else:

3> store in the UE Inactive AS Context the current KgNB and KRRCint keys, the ROHC state, the stored QoS flow to DRB mapping rules, the C-RNTI used in the source PCell, the *cellIdentity* and the physical cell identity of the source PCell, the *spCellConfigCommon* within *ReconfigurationWithSync* of the NR PSCell (if configured) and all other parameters configured except for:

- parameters within *ReconfigurationWithSync* of the PCell;

- parameters within *ReconfigurationWithSync* of the NR PSCell, if configured;

- parameters within *MobilityControlInfoSCG* of the E-UTRA PSCell, if configured;

- *servingCellConfigCommonSIB*;

NOTE 2: NR sidelink communication related configurations and logged measurement configuration are not stored as UE Inactive AS Context, when UE enters RRC\_INACTIVE.

2> suspend all SRB(s) and DRB(s), except SRB0;

2> indicate PDCP suspend to lower layers of all DRBs;

2> if the *t380* is included:

3> start timer T380, with the timer value set to *t380*;

2> if the *RRCRelease* message is including the *waitTime*:

3> start timer T302 with the value set to the *waitTime*;

3> inform upper layers that access barring is applicable for all access categories except categories '0' and '2';

2> if T390 is running:

3> stop timer T390 for all access categories;

3> perform the actions as specified in 5.3.14.4;

2> indicate the suspension of the RRC connection to upper layers;

2> enter RRC\_INACTIVE and perform cell selection as specified in TS 38.304 [20];

1> else

2> perform the actions upon going to RRC\_IDLE as specified in 5.3.11, with the release cause 'other'.

#### 5.3.8.4 T320 expiry

The UE shall:

1> if T320 expires:

2> if stored, discard the cell reselection priority information provided by the *cellReselectionPriorities* or inherited from another RAT;

2> apply the cell reselection priority information broadcast in the system information.

#### 5.3.8.5 UE actions upon the expiry of *DataInactivityTimer*

Upon receiving the expiry of *DataInactivityTimer* from lower layers while in RRC\_CONNECTED, the UE shall:

1> perform the actions upon going to RRC\_IDLE as specified in 5.3.11, with release cause 'RRC connection failure'.

*<Next modification>*

### 6.2.2 Message definitions

*<Partially omitted>*

*<Next modification>*

#### – *SystemInformation*

The *SystemInformation* message is used to convey one or more System Information Blocks or Positioning System Information Blocks. All the SIBs or posSIBs included are transmitted with the same periodicity.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channels: BCCH

Direction: Network to UE

*SystemInformation message*

-- ASN1START

-- TAG-SYSTEMINFORMATION-START

SystemInformation ::= SEQUENCE {

 criticalExtensions CHOICE {

 systemInformation SystemInformation-IEs,

 criticalExtensionsFuture-r16 CHOICE {

 posSystemInformation-r16 PosSystemInformation-r16-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

 }

}

SystemInformation-IEs ::= SEQUENCE {

 sib-TypeAndInfo SEQUENCE (SIZE (1..maxSIB)) OF CHOICE {

 sib2 SIB2,

 sib3 SIB3,

 sib4 SIB4,

 sib5 SIB5,

 sib6 SIB6,

 sib7 SIB7,

 sib8 SIB8,

 sib9 SIB9,

 ...,

 sib10-v1610 SIB10-r16,

 sib11-v1610 SIB11-r16,

 sib12-v1610 SIB12-r16,

 sib13-v1610 SIB13-r16,

 sib14-v1610 SIB14-r16,

 sibXX-v17xy (FFS) SIBXX-r17

 },

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

-- TAG-SYSTEMINFORMATION-STOP

-- ASN1STOP

*<Next modification>*

#### – *RRCRelease*

The *RRCRelease* message is used to command the release of an RRC connection or the suspension of the RRC connection.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

*RRCRelease* message

-- ASN1START

-- TAG-RRCRELEASE-START

RRCRelease ::= SEQUENCE {

 rrc-TransactionIdentifier RRC-TransactionIdentifier,

 criticalExtensions CHOICE {

 rrcRelease RRCRelease-IEs,

 criticalExtensionsFuture SEQUENCE {}

 }

}

RRCRelease-IEs ::= SEQUENCE {

 redirectedCarrierInfo RedirectedCarrierInfo OPTIONAL, -- Need N

 cellReselectionPriorities CellReselectionPriorities OPTIONAL, -- Need R

 suspendConfig SuspendConfig OPTIONAL, -- Need R

 deprioritisationReq SEQUENCE {

 deprioritisationType ENUMERATED {frequency, nr},

 deprioritisationTimer ENUMERATED {min5, min10, min15, min30}

 } OPTIONAL, -- Need N

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension RRCRelease-v1540-IEs OPTIONAL

}

RRCRelease-v1540-IEs ::= SEQUENCE {

 waitTime RejectWaitTime OPTIONAL, -- Need N

 nonCriticalExtension RRCRelease-v1610-IEs OPTIONAL

}

RRCRelease-v1610-IEs ::= SEQUENCE {

 voiceFallbackIndication-r16 ENUMERATED {true} OPTIONAL, -- Need N

 measIdleConfig-r16 SetupRelease {MeasIdleConfigDedicated-r16} OPTIONAL, -- Need M

 nonCriticalExtension RRCRelease-v1650-IEs OPTIONAL

}

RRCRelease-v1650-IEs ::= SEQUENCE {

 mpsPriorityIndication-r16 ENUMERATED {true} OPTIONAL, -- Cond Redirection2

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

RedirectedCarrierInfo ::= CHOICE {

 nr CarrierInfoNR,

 eutra RedirectedCarrierInfo-EUTRA,

 ...

}

RedirectedCarrierInfo-EUTRA ::= SEQUENCE {

 eutraFrequency ARFCN-ValueEUTRA,

 cnType ENUMERATED {epc,fiveGC} OPTIONAL -- Need N

}

CarrierInfoNR ::= SEQUENCE {

 carrierFreq ARFCN-ValueNR,

 ssbSubcarrierSpacing SubcarrierSpacing,

 smtc SSB-MTC OPTIONAL, -- Need S

 ...

}

SuspendConfig ::= SEQUENCE {

 fullI-RNTI I-RNTI-Value,

 shortI-RNTI ShortI-RNTI-Value,

 ran-PagingCycle PagingCycle,

 ran-NotificationAreaInfo RAN-NotificationAreaInfo OPTIONAL, -- Need M

 t380 PeriodicRNAU-TimerValue OPTIONAL, -- Need R

 nextHopChainingCount NextHopChainingCount,

 ...

}

PeriodicRNAU-TimerValue ::= ENUMERATED { min5, min10, min20, min30, min60, min120, min360, min720}

CellReselectionPriorities ::= SEQUENCE {

 freqPriorityListEUTRA FreqPriorityListEUTRA OPTIONAL, -- Need M

 freqPriorityListNR FreqPriorityListNR OPTIONAL, -- Need M

 t320 ENUMERATED {min5, min10, min20, min30, min60, min120, min180, spare1} OPTIONAL, -- Need R

 ...,

 [[

 freqPriorityListNRForSlicing-r17 freqPriorityListNRForSlicing-r17 OPTIONAL, - Need M

 ]]

}

PagingCycle ::= ENUMERATED {rf32, rf64, rf128, rf256}

FreqPriorityListEUTRA ::= SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA

FreqPriorityListNR ::= SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityNR

FreqPriorityEUTRA ::= SEQUENCE {

 carrierFreq ARFCN-ValueEUTRA,

 cellReselectionPriority CellReselectionPriority,

 cellReselectionSubPriority CellReselectionSubPriority OPTIONAL -- Need R

}

FreqPriorityNR ::= SEQUENCE {

 carrierFreq ARFCN-ValueNR,

 cellReselectionPriority CellReselectionPriority,

 cellReselectionSubPriority CellReselectionSubPriority OPTIONAL -- Need R

}

RAN-NotificationAreaInfo ::= CHOICE {

 cellList PLMN-RAN-AreaCellList,

 ran-AreaConfigList PLMN-RAN-AreaConfigList,

 ...

}

PLMN-RAN-AreaCellList ::= SEQUENCE (SIZE (1.. maxPLMNIdentities)) OF PLMN-RAN-AreaCell

PLMN-RAN-AreaCell ::= SEQUENCE {

 plmn-Identity PLMN-Identity OPTIONAL, -- Need S

 ran-AreaCells SEQUENCE (SIZE (1..32)) OF CellIdentity

}

PLMN-RAN-AreaConfigList ::= SEQUENCE (SIZE (1..maxPLMNIdentities)) OF PLMN-RAN-AreaConfig

PLMN-RAN-AreaConfig ::= SEQUENCE {

 plmn-Identity PLMN-Identity OPTIONAL, -- Need S

 ran-Area SEQUENCE (SIZE (1..16)) OF RAN-AreaConfig

}

RAN-AreaConfig ::= SEQUENCE {

 trackingAreaCode TrackingAreaCode,

 ran-AreaCodeList SEQUENCE (SIZE (1..32)) OF RAN-AreaCode OPTIONAL -- Need R

}

-- TAG-RRCRELEASE-STOP

-- ASN1STOP

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| --- |
| *RRCRelease-IEs* field descriptions |
| ***cnType***Indicate that the UE is redirected to EPC or 5GC. |
| ***deprioritisationReq***Indicates whether the current frequency or RAT is to be de-prioritised. |
| ***deprioritisationTimer***Indicates the period for which either the current carrier frequency or NR is deprioritised. Value *minN* corresponds to N minutes. |
| ***measIdleConfig***Indicates measurement configuration to be stored and used by the UE while in RRC\_IDLE or RRC\_INACTIVE. |
| ***mpsPriorityIndication***Indicates the UE can set the establishment cause to mps-PriorityAccess for a new connection to a new RAT following a redirect to NR. If the target RAT is E-UTRA, see TS 36.331 [10]. The gNB sets the indication only for UEs authorized to receive MPS treatment as indicated by ARP and/or QoS characteristics at the gNB, and it is applicable only for this instance of release with redirection to carrier/RAT included in the *redirectedCarrierInfo* field in the *RRCRelease* message. |
| ***suspendConfig***Indicates configuration for the RRC\_INACTIVE state. The network does not configure *suspendConfig* when the network redirect the UE to an inter-RAT carrier frequency or if the UE is configured with a DAPS bearer. |
| ***redirectedCarrierInfo***Indicates a carrier frequency (downlink for FDD) and is used to redirect the UE to an NR or an inter-RAT carrier frequency, by means of cell selection at transition to RRC\_IDLE or RRC\_INACTIVE as specified in TS 38.304 [20]. Based on UE capability, the network may include *redirectedCarrierInfo* in *RRCRelease* message with *suspendConfig* if this message is sent in response to an *RRCResumeRequest* or an *RRCResumeRequest1* which is triggered by the NAS layer (see 5.3.1.4 in TS 24.501 [23]). |
| ***voiceFallbackIndication***Indicates the RRC release is triggered by EPS fallback for IMS voice as specified in TS 23.502 [43]. |

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| *CarrierInfoNR* field descriptions |
| ***carrierFreq***Indicates the redirected NR frequency. |
| ***ssbSubcarrierSpacing***Subcarrier spacing of SSB in the redirected SSB frequency. Only the values 15 kHz or 30 kHz (FR1), and 120 kHz or 240 kHz (FR2) are applicable. |
| ***smtc***The SSB periodicity/offset/duration configuration for the redirected SSB frequency. It is based on timing reference of PCell. If the field is absent, the UE uses the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. |

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| *RAN-NotificationAreaInfo* field descriptions |
| ***cellList***A list of cells configured as RAN area. |
| ***ran-AreaConfigList***A list of RAN area codes or RA code(s) as RAN area. |

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| *PLMN-RAN-AreaConfig* field descriptions |
| ***plmn-Identity***PLMN Identity to which the cells in *ran-Area* belong. If the field is absent the UE not in SNPN access mode uses the ID of the registered PLMN. This field is not included for UE in SNPN access mode (for UE in SNPN access mode the *ran-Area* always belongs to the registered SNPN). |
| ***ran-AreaCodeList***The total number of RAN-AreaCodes of all PLMNs does not exceed 32. |
| ***ran-Area***Indicates whether TA code(s) or RAN area code(s) are used for the RAN notification area. The network uses only TA code(s) or both TA code(s) and RAN area code(s) to configure a UE. The total number of TACs across all PLMNs does not exceed 16. |

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| *PLMN-RAN-AreaCell* field descriptions |
| ***plmn-Identity***PLMN Identity to which the cells in *ran-AreaCells* belong. If the field is absent the UE not in SNPN access mode uses the ID of the registered PLMN. This field is not included for UE in SNPN access mode (for UE in SNPN access mode the *ran-AreaCells* always belongs to the registered SNPN). |
| ***ran-AreaCells***The total number of cells of all PLMNs does not exceed 32. |

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| *SuspendConfig* field descriptions |
| ***ran-NotificationAreaInfo***Network ensures that the UE in RRC\_INACTIVE always has a valid *ran-NotificationAreaInfo*. |
| ***ran-PagingCycle***Refers to the UE specific cycle for RAN-initiated paging. Value *rf32* corresponds to 32 radio frames, value *rf64* corresponds to 64 radio frames and so on. |
| ***t380***Refers to the timer that triggers the periodic RNAU procedure in UE. Value *min5* corresponds to 5 minutes, value *min10* corresponds to 10 minutes and so on. |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *Redirection2* | The field is optionally present, Need R, if *redirectedCarrierInfo* is included; otherwise the field is not present. |

*<Next modification>*

### 6.3.1 System information blocks

#### – *SIB2*

*SIB2* contains cell re-selection information common for intra-frequency, inter-frequency and/or inter-RAT cell re-selection (i.e. applicable for more than one type of cell re-selection but not necessarily all) as well as intra-frequency cell re-selection information other than neighbouring cell related.

*SIB2* information element

-- ASN1START

-- TAG-SIB2-START

SIB2 ::= SEQUENCE {

 cellReselectionInfoCommon SEQUENCE {

 nrofSS-BlocksToAverage INTEGER (2..maxNrofSS-BlocksToAverage) OPTIONAL, -- Need S

 absThreshSS-BlocksConsolidation ThresholdNR OPTIONAL, -- Need S

 rangeToBestCell RangeToBestCell OPTIONAL, -- Need R

 q-Hyst ENUMERATED {

 dB0, dB1, dB2, dB3, dB4, dB5, dB6, dB8, dB10,

 dB12, dB14, dB16, dB18, dB20, dB22, dB24},

 speedStateReselectionPars SEQUENCE {

 mobilityStateParameters MobilityStateParameters,

 q-HystSF SEQUENCE {

 sf-Medium ENUMERATED {dB-6, dB-4, dB-2, dB0},

 sf-High ENUMERATED {dB-6, dB-4, dB-2, dB0}

 }

 } OPTIONAL, -- Need R

 ...

 },

 cellReselectionServingFreqInfo SEQUENCE {

 s-NonIntraSearchP ReselectionThreshold OPTIONAL, -- Need S

 s-NonIntraSearchQ ReselectionThresholdQ OPTIONAL, -- Need S

 threshServingLowP ReselectionThreshold,

 threshServingLowQ ReselectionThresholdQ OPTIONAL, -- Need R

 cellReselectionPriority CellReselectionPriority,

 cellReselectionSubPriority CellReselectionSubPriority OPTIONAL, -- Need R

 ...

 },

 intraFreqCellReselectionInfo SEQUENCE {

 q-RxLevMin Q-RxLevMin,

 q-RxLevMinSUL Q-RxLevMin OPTIONAL, -- Need R

 q-QualMin Q-QualMin OPTIONAL, -- Need S

 s-IntraSearchP ReselectionThreshold,

 s-IntraSearchQ ReselectionThresholdQ OPTIONAL, -- Need S

 t-ReselectionNR T-Reselection,

 frequencyBandList MultiFrequencyBandListNR-SIB OPTIONAL, -- Need S

 frequencyBandListSUL MultiFrequencyBandListNR-SIB OPTIONAL, -- Need R

 p-Max P-Max OPTIONAL, -- Need S

 smtc SSB-MTC OPTIONAL, -- Need S

 ss-RSSI-Measurement SS-RSSI-Measurement OPTIONAL, -- Need R

 ssb-ToMeasure SSB-ToMeasure OPTIONAL, -- Need S

 deriveSSB-IndexFromCell BOOLEAN,

 ...,

 [[

 t-ReselectionNR-SF SpeedStateScaleFactors OPTIONAL -- Need N

 ]],

 [[

 smtc2-LP-r16 SSB-MTC2-LP-r16 OPTIONAL, -- Need R

 ssb-PositionQCL-Common-r16 SSB-PositionQCL-Relation-r16 OPTIONAL -- Cond SharedSpectrum

 ]]

 },

 ...,

 [[

 relaxedMeasurement-r16 SEQUENCE {

 lowMobilityEvaluation-r16 SEQUENCE {

 s-SearchDeltaP-r16 ENUMERATED {

 dB3, dB6, dB9, dB12, dB15,

 spare3, spare2, spare1},

 t-SearchDeltaP-r16 ENUMERATED {

 s5, s10, s20, s30, s60, s120, s180,

 s240, s300, spare7, spare6, spare5,

 spare4, spare3, spare2, spare1}

 } OPTIONAL, -- Need R

 cellEdgeEvaluation-r16 SEQUENCE {

 s-SearchThresholdP-r16 ReselectionThreshold,

 s-SearchThresholdQ-r16 ReselectionThresholdQ OPTIONAL -- Need R

 } OPTIONAL, -- Need R

 combineRelaxedMeasCondition-r16 ENUMERATED {true} OPTIONAL, -- Need R

 highPriorityMeasRelax-r16 ENUMERATED {true} OPTIONAL -- Need R

 } OPTIONAL -- Need R

 ]]

}

RangeToBestCell ::= Q-OffsetRange

-- TAG-SIB2-STOP

-- ASN1STOP

| *SIB2* field descriptions |
| --- |
| ***absThreshSS-BlocksConsolidation***Threshold for consolidation of L1 measurements per RS index. If the field is absent, the UE uses the measurement quantity as specified in TS 38.304 [20]. |
| ***cellEdgeEvaluation***Indicates the criteria for a UE to detect that it is not at cell edge, in order to relax measurement requirements for cell reselection (see TS 38.304 [20], clause 5.2.4.9.2). |
| ***cellReselectionInfoCommon***Cell re-selection information common for intra-frequency, inter-frequency and/ or inter-RAT cell re-selection. |
| ***cellReselectionServingFreqInfo***Information common for non-intra-frequency cell re-selection i.e. cell re-selection to inter-frequency and inter-RAT cells. |
| ***combineRelaxedMeasCondition***When both *lowMobilityEvalutation* and *cellEdgeEvalutation* criteria are present in SIB2, this parameter configures the UE to fulfil both criteria in order to relax measurement requirements for cell reselection. If the field is absent, the UE is allowed to relax measurement requirements for cell reselection when either or both of the criteria are met. (See TS 38.304 [20], clause 5.2.4.9.0) |
| ***deriveSSB-IndexFromCell***This field indicates whether the UE can utilize serving cell timing to derive the index of SS block transmitted by neighbour cell. If this field is set to *true*, the UE assumes SFN and frame boundary alignment across cells on the serving frequency as specified in TS 38.133 [14]. |
| ***frequencyBandList***Indicates the list of frequency bands for which the NR cell reselection parameters apply. The UE behaviour in case the field is absent is described in subclause 5.2.2.4.3. |
| ***highPriorityMeasRelax***Indicates whether measurements can be relaxed on high priority frequencies (see TS 38.304 [20], clause 5.2.4.9.0). If the field is absent, the UE shall not relax measurements on high priority frequencies beyond "Thigher\_priority\_search" unless both low mobility and not at cell edge criteria are fulfilled (see TS 38.133 [14], clause 4.2.2.7, and TS 38.304 [20], clause 5.2.4.9.0). |
| ***intraFreqCellReselectionInfo***Cell re-selection information common for intra-frequency cells. |
| ***lowMobilityEvaluation***Indicates the criteria for a UE to detect low mobility, in order to relax measurement requirements for cell reselection (see TS 38.304 [20], clause 5.2.4.9.1). |
| ***nrofSS-BlocksToAverage***Number of SS blocks to average for cell measurement derivation. If the field is absent the UE uses the measurement quantity as specified in TS 38.304 [20]. |
| ***p-Max***Value in dBm applicable for the intra-frequency neighbouring NR cells. If absent the UE applies the maximum power according to TS 38.101-1 [15] in case of an FR1 cell or TS 38.101-2 [39] in case of an FR2 cell. In this release of the specification, if *p-Max* is present on a carrier frequency in FR2, the UE shall ignore the field and applies the maximum power according to TS 38.101-2 [39]. This field is ignored by IAB-MT. The IAB-MT applies output power and emissions requirements, as specified in TS 38.174 [63]. |
| ***q-Hyst***Parameter "*Qhyst*" in TS 38.304 [20], Value in dB. Value *dB1* corresponds to 1 dB, *dB2* corresponds to 2 dB and so on. |
| ***q-HystSF***Parameter "Speed dependent ScalingFactor for Qhyst" in TS 38.304 [20]. The *sf-Medium* and *sf-High* concern the additional hysteresis to be applied, in Medium and High Mobility state respectively, to Qhyst as defined in TS 38.304 [20]. In dB. Value *dB-6* corresponds to -6dB, *dB-4* corresponds to -4dB and so on. |
| ***q-QualMin***Parameter "Qqualmin" in TS 38.304 [20], applicable for intra-frequency neighbour cells. If the field is absent, the UE applies the (default) value of negative infinity for Qqualmin.  |
| ***q-RxLevMin***Parameter "Qrxlevmin" in TS 38.304 [20], applicable for intra-frequency neighbour cells. |
| ***q-RxLevMinSUL***Parameter "Qrxlevmin" in TS 38.304 [20], applicable for intra-frequency neighbour cells. |
| ***rangeToBestCell***Parameter "rangeToBestCell" in TS 38.304 [20]. The network configures only non-negative (in dB) values. |
| ***relaxedMeasurement***Configuration to allow relaxation of RRM measurement requirements for cell reselection (see TS 38.304 [20], clause 5.2.4.9). |
| ***s-IntraSearchP***Parameter "SIntraSearchP" in TS 38.304 [20]. |
| ***s-IntraSearchQ***Parameter "SIntraSearchQ" in TS 38.304 [20]. If the field is absent, the UE applies the (default) value of 0 dB for SIntraSearchQ. |
| ***s-NonIntraSearchP***Parameter "SnonIntraSearchP" in TS 38.304 [20]. If this field is absent, the UE applies the (default) value of infinity for SnonIntraSearchP. |
| ***s-NonIntraSearchQ***Parameter "SnonIntraSearchQ" in TS 38.304 [20]. If the field is absent, the UE applies the (default) value of 0 dB for SnonIntraSearchQ. |
| ***s-SearchDeltaP***Parameter "SSearchDeltaP" in TS 38.304 [20]. Value dB3 corresponds to 3 dB, dB6 corresponds to 6 dB and so on. |
| ***s-SearchThresholdP***Parameter "SSearchThresholdP" in TS 38.304 [20]. The network configures *s-SearchThresholdP* to be less than or equal to *s-IntraSearchP* and *s-NonIntraSearchP*. |
| ***s-SearchThresholdQ***Parameter "SSearchThresholdQ" in TS 38.304 [20]. The network configures *s-SearchThresholdQ* to be less than or equal to *s-IntraSearchQ* and *s-NonIntraSearchQ*. |
| ***smtc***Measurement timing configuration for intra-frequency measurement. If this field is absent, the UE assumes that SSB periodicity is 5 ms for the intra-frequnecy cells. |
| ***smtc2-LP***Measurement timing configuration for intra-frequency neighbour cells with a Long Periodicity (LP) indicated by periodicity in *smtc2-LP*. The timing offset and duration are equal to the offset and duration indicated in *smtc* in *intraFreqCellReselectionInfo*. The periodicity in *smtc2-LP* can only be set to a value strictly larger than the periodicity in *smtc* in *intraFreqCellReselectionInfo* (e.g. if *smtc* indicates sf20 the Long Periodicity can only be set to sf40, sf80 or sf160, if *smtc* indicates sf160, *smtc2-LP* cannot be configured). The *pci-List*, if present, includes the physical cell identities of the intra-frequency neighbour cells with Long Periodicity. If *smtc2-LP* is absent, the UE assumes that there are no intra-frequency neighbour cells with a Long Periodicity. |
| ***ssb-PositionQCL-Common***Indicates the QCL relation between SS/PBCH blocks for intra-frequency neighbor cells as specified in TS 38.213 [13], clause 4.1. |
| ***ssb-ToMeasure***The set of SS blocks to be measured within the SMTC measurement duration (see TS 38.215 [9]). When the field is absent the UE measures on all SS-blocks. |
| ***t-ReselectionNR***Parameter "TreselectionNR" in TS 38.304 [20]. |
| ***t-ReselectionNR-SF***Parameter "Speed dependent ScalingFactor for TreselectionNR" in TS 38.304 [20]. If the field is absent, the UE behaviour is specified in TS 38.304 [20]. |
| ***threshServingLowP***Parameter "ThreshServing, LowP" in TS 38.304 [20]. |
| ***threshServingLowQ***Parameter "ThreshServing, LowQ" in TS 38.304 [20]. |
| ***t-SearchDeltaP***Parameter "TSearchDeltaP" in TS 38.304 [20]. Value in seconds. Value *s5* means 5 seconds, value *s10* means 10 seconds and so on. |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *SharedSpectrum* | This field is mandatory present if this intra-frequency operates with shared spectrum channel access. Otherwise, it is absent, Need R. |

#### – *SIB3*

*SIB3* contains neighbouring cell related information relevant only for intra-frequency cell re-selection. The IE includes cells with specific re-selection parameters as well as blacklisted cells.

*SIB3* information element

-- ASN1START

-- TAG-SIB3-START

SIB3 ::= SEQUENCE {

 intraFreqNeighCellList IntraFreqNeighCellList OPTIONAL, -- Need R

 intraFreqBlackCellList IntraFreqBlackCellList OPTIONAL, -- Need R

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 ...,

 [[

 intraFreqNeighCellList-v1610 IntraFreqNeighCellList-v1610 OPTIONAL, -- Need R

 intraFreqWhiteCellList-r16 IntraFreqWhiteCellList-r16 OPTIONAL, -- Cond SharedSpectrum2

 intraFreqCAG-CellList-r16 SEQUENCE (SIZE (1..maxPLMN)) OF IntraFreqCAG-CellListPerPLMN-r16 OPTIONAL -- Need R

 ]]

}

IntraFreqNeighCellList ::= SEQUENCE (SIZE (1..maxCellIntra)) OF IntraFreqNeighCellInfo

IntraFreqNeighCellList-v1610::= SEQUENCE (SIZE (1..maxCellIntra)) OF IntraFreqNeighCellInfo-v1610

IntraFreqNeighCellInfo ::= SEQUENCE {

 physCellId PhysCellId,

 q-OffsetCell Q-OffsetRange,

 q-RxLevMinOffsetCell INTEGER (1..8) OPTIONAL, -- Need R

 q-RxLevMinOffsetCellSUL INTEGER (1..8) OPTIONAL, -- Need R

 q-QualMinOffsetCell INTEGER (1..8) OPTIONAL, -- Need R

 ...

}

IntraFreqNeighCellInfo-v1610 ::= SEQUENCE {

 ssb-PositionQCL-r16 SSB-PositionQCL-Relation-r16 OPTIONAL -- Cond SharedSpectrum2

}

IntraFreqBlackCellList ::= SEQUENCE (SIZE (1..maxCellBlack)) OF PCI-Range

IntraFreqWhiteCellList-r16 ::= SEQUENCE (SIZE (1..maxCellWhite)) OF PCI-Range

IntraFreqCAG-CellListPerPLMN-r16 ::= SEQUENCE {

 plmn-IdentityIndex-r16 INTEGER (1..maxPLMN),

 cag-CellList-r16 SEQUENCE (SIZE (1..maxCAG-Cell-r16)) OF PCI-Range

}

-- TAG-SIB3-STOP

-- ASN1STOP

| *SIB3* field descriptions |
| --- |
| ***intraFreqBlackCellList***List of blacklisted intra-frequency neighbouring cells. |
| ***intraFreqCAG-CellList***List of intra-frequency neighbouring CAG cells (as defined in TS 38.304 [20]) per PLMN. |
| ***intraFreqNeighCellList***List of intra-frequency neighbouring cells with specific cell re-selection parameters. If *intraFreqNeighCellList-v1610* is present, it shall contain the same number of entries, listed in the same order as in *intraFreqNeighCellList* (without suffix). |
| ***intraFreqWhiteCellList***List of whitelisted intra-frequency neighbouring cells, see TS 38.304 [20], clause 5.2.4. |
| ***q-OffsetCell***Parameter "Qoffsets,n" in TS 38.304 [20]. |
| ***q-QualMinOffsetCell***Parameter "Qqualminoffsetcell" in TS 38.304 [20]. Actual value Qqualminoffsetcell = field value [dB]. |
| ***q-RxLevMinOffsetCell***Parameter "Qrxlevminoffsetcell" in TS 38.304 [20]. Actual value Qrxlevminoffsetcell = field value \* 2 [dB]. |
| ***q-RxLevMinOffsetCellSUL***Parameter "QrxlevminoffsetcellSUL" in TS 38.304 [20]. Actual value QrxlevminoffsetcellSUL = field value \* 2 [dB]. |
| ***ssb-PositionQCL***Indicates the QCL relation between SS/PBCH blocks for a specific intra-frequency neighbor cell as specified in TS 38.213 [13], clause 4.1. If provided, the cell specific value overwrites the value signalled by *ssb-PositionQCL-Common* in *SIB2* for the indicated cell. |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *SharedSpectrum2* | The field is optional present, Need R, if this intra-frequency or neighbor cell operates with shared spectrum channel access. Otherwise, it is absent, Need R. |

#### – *SIB4*

*SIB4* contains information relevant for inter-frequency cell re-selection (i.e. information about other NR frequencies and inter-frequency neighbouring cells relevant for cell re-selection), which can also be used for NR idle/inactive measurements. The IE includes cell re-selection parameters common for a frequency as well as cell specific re-selection parameters.

*SIB4* information element

-- ASN1START

-- TAG-SIB4-START

SIB4 ::= SEQUENCE {

 interFreqCarrierFreqList InterFreqCarrierFreqList,

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 ...,

 [[

 interFreqCarrierFreqList-v1610 InterFreqCarrierFreqList-v1610 OPTIONAL -- Need R

 ]]

}

InterFreqCarrierFreqList ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo

InterFreqCarrierFreqList-v1610 ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1610

InterFreqCarrierFreqInfo ::= SEQUENCE {

 dl-CarrierFreq ARFCN-ValueNR,

 frequencyBandList MultiFrequencyBandListNR-SIB OPTIONAL, -- Cond Mandatory

 frequencyBandListSUL MultiFrequencyBandListNR-SIB OPTIONAL, -- Need R

 nrofSS-BlocksToAverage INTEGER (2..maxNrofSS-BlocksToAverage) OPTIONAL, -- Need S

 absThreshSS-BlocksConsolidation ThresholdNR OPTIONAL, -- Need S

 smtc SSB-MTC OPTIONAL, -- Need S

 ssbSubcarrierSpacing SubcarrierSpacing,

 ssb-ToMeasure SSB-ToMeasure OPTIONAL, -- Need S

 deriveSSB-IndexFromCell BOOLEAN,

 ss-RSSI-Measurement SS-RSSI-Measurement OPTIONAL, -- Need R

 q-RxLevMin Q-RxLevMin,

 q-RxLevMinSUL Q-RxLevMin OPTIONAL, -- Need R

 q-QualMin Q-QualMin OPTIONAL, -- Need S

 p-Max P-Max OPTIONAL, -- Need S

 t-ReselectionNR T-Reselection,

 t-ReselectionNR-SF SpeedStateScaleFactors OPTIONAL, -- Need S

 threshX-HighP ReselectionThreshold,

 threshX-LowP ReselectionThreshold,

 threshX-Q SEQUENCE {

 threshX-HighQ ReselectionThresholdQ,

 threshX-LowQ ReselectionThresholdQ

 } OPTIONAL, -- Cond RSRQ

 cellReselectionPriority CellReselectionPriority OPTIONAL, -- Need R

 cellReselectionSubPriority CellReselectionSubPriority OPTIONAL, -- Need R

 q-OffsetFreq Q-OffsetRange DEFAULT dB0,

 interFreqNeighCellList InterFreqNeighCellList OPTIONAL, -- Need R

 interFreqBlackCellList InterFreqBlackCellList OPTIONAL, -- Need R

 ...

}

InterFreqCarrierFreqInfo-v1610 ::= SEQUENCE {

 interFreqNeighCellList-v1610 InterFreqNeighCellList-v1610 OPTIONAL, -- Need R

 smtc2-LP-r16 SSB-MTC2-LP-r16 OPTIONAL, -- Need R

 interFreqWhiteCellList-r16 InterFreqWhiteCellList-r16 OPTIONAL, -- Cond SharedSpectrum2

 ssb-PositionQCL-Common-r16 SSB-PositionQCL-Relation-r16 OPTIONAL, -- Cond SharedSpectrum

 interFreqCAG-CellList-r16 SEQUENCE (SIZE (1..maxPLMN)) OF InterFreqCAG-CellListPerPLMN-r16 OPTIONAL -- Need R

}

InterFreqNeighCellList ::= SEQUENCE (SIZE (1..maxCellInter)) OF InterFreqNeighCellInfo

InterFreqNeighCellList-v1610 ::= SEQUENCE (SIZE (1..maxCellInter)) OF InterFreqNeighCellInfo-v1610

InterFreqNeighCellInfo ::= SEQUENCE {

 physCellId PhysCellId,

 q-OffsetCell Q-OffsetRange,

 q-RxLevMinOffsetCell INTEGER (1..8) OPTIONAL, -- Need R

 q-RxLevMinOffsetCellSUL INTEGER (1..8) OPTIONAL, -- Need R

 q-QualMinOffsetCell INTEGER (1..8) OPTIONAL, -- Need R

 ...

}

InterFreqNeighCellInfo-v1610 ::= SEQUENCE {

 ssb-PositionQCL-r16 SSB-PositionQCL-Relation-r16 OPTIONAL -- Cond SharedSpectrum2

}

InterFreqBlackCellList ::= SEQUENCE (SIZE (1..maxCellBlack)) OF PCI-Range

InterFreqWhiteCellList-r16 ::= SEQUENCE (SIZE (1..maxCellWhite)) OF PCI-Range

InterFreqCAG-CellListPerPLMN-r16 ::= SEQUENCE {

 plmn-IdentityIndex-r16 INTEGER (1..maxPLMN),

 cag-CellList-r16 SEQUENCE (SIZE (1..maxCAG-Cell-r16)) OF PCI-Range

}

-- TAG-SIB4-STOP

-- ASN1STOP

| *SIB4* field descriptions |
| --- |
| ***absThreshSS-BlocksConsolidation***Threshold for consolidation of L1 measurements per RS index. If the field is absent, the UE uses the measurement quantity as specified in TS 38.304 [20]. |
| ***deriveSSB-IndexFromCell***This field indicates whether the UE may use the timing of any detected cell on that frequency to derive the SSB index of all neighbour cells on that frequency. If this field is set to *true*, the UE assumes SFN and frame boundary alignment across cells on the neighbor frequency as specified in TS 38.133 [14]. |
| ***dl-CarrierFreq***This field indicates center frequency of the SS block of the neighbour cells, where the frequency corresponds to a GSCN value as specified in TS 38.101-1 [15]. |
| ***frequencyBandList***Indicates the list of frequency bands for which the NR cell reselection parameters apply. |
| ***interFreqBlackCellList***List of blacklisted inter-frequency neighbouring cells. |
| ***interFreqCAG-CellList***List of inter-frequency neighbouring CAG cells (as defined in TS 38.304 [20] per PLMN. |
| ***interFreqCarrierFreqList***List of neighbouring carrier frequencies and frequency specific cell re-selection information. If *iinterFreqCarrierFreqList-v1610* is present, it shall contain the same number of entries, listed in the same order as in *interFreqCarrierFreqList* (without suffix). |
| ***interFreqNeighCellList***List of inter-frequency neighbouring cells with specific cell re-selection parameters. If *interFreqNeighCellList-v1610* is present, it shall contain the same number of entries, listed in the same order as in *interFreqNeighCellList* (without suffix). |
| ***interFreqWhiteCellList***List of whitelisted inter-frequency neighbouring cells, see TS 38.304 [20], clause 5.2.4. |
| ***nrofSS-BlocksToAverage***Number of SS blocks to average for cell measurement derivation. If the field is absent, the UE uses the measurement quantity as specified in TS 38.304 [20]. |
| ***p-Max***Value in dBm applicable for the neighbouring NR cells on this carrier frequency. If absent the UE applies the maximum power according to TS 38.101-1 [15] in case of an FR1 cell or TS 38.101-2 [39] in case of an FR2 cell. In this release of the specification, if *p-Max* is present on a carrier frequency in FR2, the UE shall ignore the field and applies the maximum power according to TS 38.101-2 [39]. This field is ignored by IAB-MT. The IAB-MT applies output power and emissions requirements, as specified in TS 38.174 [63]. |
| ***q-OffsetCell***Parameter "Qoffsets,n" in TS 38.304 [20]. |
| ***q-OffsetFreq***Parameter "Qoffsetfrequency" in TS 38.304 [20]. |
| ***q-QualMin***Parameter "Qqualmin" in TS 38.304 [20]. If the field is absent, the UE applies the (default) value of negative infinity for Qqualmin. |
| ***q-QualMinOffsetCell***Parameter "Qqualminoffsetcell" in TS 38.304 [20]. Actual value Qqualminoffsetcell = field value [dB]. |
| ***q-RxLevMin***Parameter "Qrxlevmin" in TS 38.304 [20]. |
| ***q-RxLevMinOffsetCell***Parameter "Qrxlevminoffsetcell" in TS 38.304 [20]. Actual value Qrxlevminoffsetcell = field value \* 2 [dB]. |
| ***q-RxLevMinOffsetCellSUL***Parameter "QrxlevminoffsetcellSUL" in TS 38.304 [20]. Actual value QrxlevminoffsetcellSUL = field value \* 2 [dB]. |
| ***q-RxLevMinSUL***Parameter "Qrxlevmin" in TS 38.304 [20]. |
| ***smtc***Measurement timing configuration for inter-frequency measurement. If this field is absent, the UE assumes that SSB periodicity is 5 ms in this frequency. |
| ***smtc2-LP***Measurement timing configuration for inter-frequency neighbour cells with a Long Periodicity (LP) indicated by periodicity in *smtc2-LP*. The timing offset and duration are equal to the offset and duration indicated in *smtc* in *InterFreqCarrierFreqInfo*. The periodicity in *smtc2-LP* can only be set to a value strictly larger than the periodicity in *smtc* in *InterFreqCarrierFreqInfo* (e.g. if *smtc* indicates sf20 the Long Periodicity can only be set to sf40, sf80 or sf160, if *smtc* indicates sf160, *smtc2-LP* cannot be configured). The *pci-List*, if present, includes the physical cell identities of the inter-frequency neighbour cells with Long Periodicity. If *smtc2-LP* is absent, the UE assumes that there are no inter-frequency neighbour cells with a Long Periodicity. |
| ***ssb-PositionQCL***Indicates the QCL relation between SS/PBCH blocks for a specific neighbor cell as specified in TS 38.213 [13], clause 4.1. If provided, the cell specific value overwrites the common value signalled by *ssb-PositionQCL-Common* in *SIB4* for the indicated cell. |
| ***ssb-PositionQCL-Common***Indicates the QCL relation between SS/PBCH blocks for inter-frequency neighbor cells as specified in TS 38.213 [13], clause 4.1. |
| ***ssb-ToMeasure***The set of SS blocks to be measured within the SMTC measurement duration (see TS 38.215 [9]). When the field is absent the UE measures on all SS-blocks. |
| ***ssbSubcarrierSpacing***Subcarrier spacing of SSB. Only the values 15 kHz or 30 kHz (FR1), and 120 kHz or 240 kHz (FR2) are applicable. |
| ***threshX-HighP***Parameter "ThreshX, HighP" in TS 38.304 [20]. |
| ***threshX-HighQ***Parameter "ThreshX, HighQ" in TS 38.304 [20]. |
| ***threshX-LowP***Parameter "ThreshX, LowP" in TS 38.304 [20]. |
| ***threshX-LowQ***Parameter "ThreshX, LowQ" in TS 38.304 [20]. |
| ***t-ReselectionNR***Parameter "TreselectionNR" in TS 38.304 [20]. |
| ***t-ReselectionNR-SF***Parameter "Speed dependent ScalingFactor for TreselectionNR" in TS 38.304 [20]. If the field is absent, the UE behaviour is specified in TS 38.304 [20]. |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *Mandatory* | The field is mandatory present in SIB4. |
| *RSRQ* | The field is mandatory present if *threshServingLowQ* is present in *SIB2*; otherwise it is absent. |
| *SharedSpectrum* | This field is mandatory present if this inter-frequency operates with shared spectrum channel access. Otherwise, it is absent, Need R. |
| *SharedSpectrum2* | The field is optional present, Need R, if this inter-frequency or neighbor cell operates with shared spectrum channel access. Otherwise, it is absent, Need R. |

*<Next modification>*

#### – *SIB13*

SIB13 contains configurations of V2X sidelink communication defined in TS 36.331 [10].

*SIB13* information element

-- ASN1START

-- TAG-SIB13-START

SIB13-r16 ::= SEQUENCE {

 sl-V2X-ConfigCommon-r16 OCTET STRING,

 dummy OCTET STRING,

 tdd-Config-r16 OCTET STRING,

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 ...

}

-- TAG-SIB13-STOP

-- ASN1STOP

| *SIB13* field descriptions |
| --- |
| ***dummy***This field is not used in the specification and the UE ignores the received value. |
| ***sl-V2X-ConfigCommon***This field includes the E-UTRA *SystemInformationBlockType21* message as specified in TS 36.331 [10]. |
| ***tdd-Config***This field includes the *tdd-Config* in E-UTRA *SystemInformationBlockType1* message as specified in TS 36.331 [10]. |

#### – *SIB14*

SIB14 contains configurations of V2X sidelink communication defined in TS 36.331 [10], which can be used jointly with that included in *SIB13*.

*SIB14* information element

-- ASN1START

-- TAG-SIB14-START

SIB14-r16 ::= SEQUENCE {

 sl-V2X-ConfigCommonExt-r16 OCTET STRING,

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 ...

}

-- TAG-SIB14-STOP

-- ASN1STOP

| *SIB14* field descriptions |
| --- |
| ***sl-V2X-ConfigCommonExt***This field includes the E-UTRA *SystemInformationBlockType26* message as specified in TS 36.331 [10]. |

#### – *SIBXX (FFS)*

SIBXX contains configurations of slice specific cell reselection information.

*SIBXX* information element

-- ASN1START

-- TAG-SIBXX-START

SIBXX-r17 ::= SEQUENCE {

 freqPriorityListNRForSlicing -r17 FreqPriorityListNRForSlicing-r17 OPTIONAL,

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 ...

}

-- TAG-SIBXX-STOP

-- ASN1STOP

| *SIBXX* field descriptions |
| --- |
| ***freqPriorityListNRForSlicing***This field indicates cell reselection priorities for slicing. |

*<Next modification>*

#### – *RACH-ConfigCommon*

The IE *RACH-ConfigCommon* is used to specify the cell specific random-access parameters.

*RACH-ConfigCommon* information element

-- ASN1START

-- TAG-RACH-CONFIGCOMMON-START

RACH-ConfigCommon ::= SEQUENCE {

 rach-ConfigGeneric RACH-ConfigGeneric,

 totalNumberOfRA-Preambles INTEGER (1..63) OPTIONAL, -- Need S

 ssb-perRACH-OccasionAndCB-PreamblesPerSSB CHOICE {

 oneEighth ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

 oneFourth ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

 oneHalf ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

 one ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

 two ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32},

 four INTEGER (1..16),

 eight INTEGER (1..8),

 sixteen INTEGER (1..4)

 } OPTIONAL, -- Need M

 groupBconfigured SEQUENCE {

 ra-Msg3SizeGroupA ENUMERATED {b56, b144, b208, b256, b282, b480, b640,

 b800, b1000, b72, spare6, spare5,spare4, spare3, spare2, spare1},

 messagePowerOffsetGroupB ENUMERATED { minusinfinity, dB0, dB5, dB8, dB10, dB12, dB15, dB18},

 numberOfRA-PreamblesGroupA INTEGER (1..64)

 } OPTIONAL, -- Need R

 ra-ContentionResolutionTimer ENUMERATED { sf8, sf16, sf24, sf32, sf40, sf48, sf56, sf64},

 rsrp-ThresholdSSB RSRP-Range OPTIONAL, -- Need R

 rsrp-ThresholdSSB-SUL RSRP-Range OPTIONAL, -- Cond SUL

 prach-RootSequenceIndex CHOICE {

 l839 INTEGER (0..837),

 l139 INTEGER (0..137)

 },

 msg1-SubcarrierSpacing SubcarrierSpacing OPTIONAL, -- Cond L139

 restrictedSetConfig ENUMERATED {unrestrictedSet, restrictedSetTypeA, restrictedSetTypeB},

 msg3-transformPrecoder ENUMERATED {enabled} OPTIONAL, -- Need R

 ...,

 [[

 ra-PrioritizationForAccessIdentity-r16 SEQUENCE {

 ra-Prioritization-r16 RA-Prioritization,

 ra-PrioritizationForAI-r16 BIT STRING (SIZE (2))

 } OPTIONAL, -- Cond InitialBWP-Only

 prach-RootSequenceIndex-r16 CHOICE {

 l571 INTEGER (0..569),

 l1151 INTEGER (0..1149)

 } OPTIONAL -- Need R

 ]],

 [[

 ra-PrioritizationForSlicing-r17 RA-PrioritizationForSlicing-r17 OPTIONAL -- Cond InitialBWP-Only

 ]]

}

-- TAG-RACH-CONFIGCOMMON-STOP

-- ASN1STOP

|  |
| --- |
| *RACH-ConfigCommon* field descriptions |
| ***messagePowerOffsetGroupB***Threshold for preamble selection. Value is in dB. Value *minusinfinity* corresponds to –infinity. Value *dB0* corresponds to 0 dB, *dB5* corresponds to 5 dB and so on. (see TS 38.321 [3], clause 5.1.2) |
| ***msg1-SubcarrierSpacing***Subcarrier spacing of PRACH (see TS 38.211 [16], clause 5.3.2). Only the values 15 or 30 kHz (FR1), and 60 or 120 kHz (FR2) are applicable. If absent, the UE applies the SCS as derived from the *prach-ConfigurationIndex* in *RACH-ConfigGeneric* (see tables Table 6.3.3.1-1, Table 6.3.3.1-2, Table 6.3.3.2-2 and Table 6.3.3.2-3, TS 38.211 [16]). The value also applies to contention free random access (*RACH-ConfigDedicated*), to SI-request and to contention-based beam failure recovery (CB-BFR). But it does not apply for contention free beam failure recovery (CF-BFR) (see *BeamFailureRecoveryConfig*). |
| ***msg3-transformPrecoder***Enables the transform precoder for Msg3 transmission according to clause 6.1.3 of TS 38.214 [19]. If the field is absent, the UE disables the transformer precoder (see TS 38.213 [13], clause 8.3). |
| ***numberOfRA-PreamblesGroupA***The number of CB preambles per SSB in group A. This determines implicitly the number of CB preambles per SSB available in group B. (see TS 38.321 [3], clause 5.1.1). The setting should be consistent with the setting of *ssb-perRACH-OccasionAndCB-PreamblesPerSSB*. |
| ***prach-RootSequenceIndex***PRACH root sequence index (see TS 38.211 [16], clause 6.3.3.1). The value range depends on whether L=839 or L=139 or L=571 or L=1151. The length of the root sequence corresponding with the index indicated in this IE should be consistent with the one indicated in *prach-ConfigurationIndex* in the *RACH-ConfigDedicated* (if configured). If *prach-RootSequenceIndex-r16* is signalled, UE shall ignore the *prach-RootSequenceIndex* (without suffix). |
| ***ra-ContentionResolutionTimer***The initial value for the contention resolution timer (see TS 38.321 [3], clause 5.1.5). Value *sf8* corresponds to 8 subframes, value *sf16* corresponds to 16 subframes, and so on. |
| ***ra-Msg3SizeGroupA***Transport Blocks size threshold in bits below which the UE shall use a contention-based RA preamble of group A. (see TS 38.321 [3], clause 5.1.2). |
| ***ra-Prioritization***Parameters which apply for prioritized random access procedure on any UL BWP of SpCell for specific Access Identities (see TS 38.321 [3], clause 5.1.1a). |
| ***ra-PrioritizationForAI***Indicates whether the field *ra-Prioritization-r16* applies for Access Identities. The first/leftmost bit corresponds to Access Identity 1, the next bit corresponds to Access Identity 2. Value 1 indicates that the field *ra-Prioritization-r16* applies otherwise the field does not apply (see TS 23.501 [32]). |
| ***rach-ConfigGeneric***RACH parameters for both regular random access and beam failure recovery. |
| ***restrictedSetConfig***Configuration of an unrestricted set or one of two types of restricted sets, see TS 38.211 [16], clause 6.3.3.1. |
| ***rsrp-ThresholdSSB***UE may select the SS block and corresponding PRACH resource for path-loss estimation and (re)transmission based on SS blocks that satisfy the threshold (see TS 38.213 [13]). |
| ***rsrp-ThresholdSSB-SUL***The UE selects SUL carrier to perform random access based on this threshold (see TS 38.321 [3], clause 5.1.1). The value applies to all the BWPs. |
| ***ssb-perRACH-OccasionAndCB-PreamblesPerSSB***The meaning of this field is twofold: the CHOICE conveys the information about the number of SSBs per RACH occasion. Value *oneEighth* corresponds to one SSB associated with 8 RACH occasions, value *oneFourth* corresponds to one SSB associated with 4 RACH occasions, and so on. The ENUMERATED part indicates the number of Contention Based preambles per SSB. Value *n4* corresponds to 4 Contention Based preambles per SSB, value *n8* corresponds to 8 Contention Based preambles per SSB, and so on. The total number of CB preambles in a RACH occasion is given by *CB-preambles-per-SSB* \* max(1, *SSB-per-rach-occasion*). See TS 38.213 [13]. |
| ***totalNumberOfRA-Preambles***Total number of preambles used for contention based and contention free 4-step or 2-step random access in the RACH resources defined in *RACH-ConfigCommon*, excluding preambles used for other purposes (e.g. for SI request). If the field is absent, all 64 preambles are available for RA. The setting should be consistent with the setting of *ssb-perRACH-OccasionAndCB-PreamblesPerSSB*, i.e. it should be a multiple of the number of SSBs per RACH occasion. |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *L139* | The field is mandatory present if *prach-RootSequenceIndex* L=139, otherwise the field is absent, Need S. |
| *SUL* | The field is mandatory present in *initialUplinkBWP* if *supplementaryUplink* is configured in *ServingCellConfigCommonSIB* or if *supplementaryUplinkConfig* is configured in *ServingCellConfigCommon*; otherwise, the field is absent. |
| *InitialBWP-Only* | This field is optionally present, Need R, if this BWP is the initial BWP of SpCell. Otherwise the field is absent. |

#### – *RACH-ConfigCommonTwoStepRA*

The IE *RACH-ConfigCommonTwoStepRA* is used to specify cell specific 2-step random-access type parameters.

*RACH-ConfigCommonTwoStepRA* information element

-- ASN1START

-- TAG-RACH-CONFIGCOMMONTWOSTEPRA-START

RACH-ConfigCommonTwoStepRA-r16 ::= SEQUENCE {

 rach-ConfigGenericTwoStepRA-r16 RACH-ConfigGenericTwoStepRA-r16,

 msgA-TotalNumberOfRA-Preambles-r16 INTEGER (1..63) OPTIONAL, -- Need S

 msgA-SSB-PerRACH-OccasionAndCB-PreamblesPerSSB-r16 CHOICE {

 oneEighth ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

 oneFourth ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

 oneHalf ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

 one ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},

 two ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32},

 four INTEGER (1..16),

 eight INTEGER (1..8),

 sixteen INTEGER (1..4)

 } OPTIONAL, -- Cond 2StepOnly

 msgA-CB-PreamblesPerSSB-PerSharedRO-r16 INTEGER (1..60) OPTIONAL, -- Cond SharedRO

 msgA-SSB-SharedRO-MaskIndex-r16 INTEGER (1..15) OPTIONAL, -- Need S

 groupB-ConfiguredTwoStepRA-r16 GroupB-ConfiguredTwoStepRA-r16 OPTIONAL, -- Need S

 msgA-PRACH-RootSequenceIndex-r16 CHOICE {

 l839 INTEGER (0..837),

 l139 INTEGER (0..137),

 l571 INTEGER (0..569),

 l1151 INTEGER (0..1149)

 } OPTIONAL, -- Cond 2StepOnly

 msgA-TransMax-r16 ENUMERATED {n1, n2, n4, n6, n8, n10, n20, n50, n100, n200} OPTIONAL, -- Need R

 msgA-RSRP-Threshold-r16 RSRP-Range OPTIONAL, -- Cond 2Step4Step

 msgA-RSRP-ThresholdSSB-r16 RSRP-Range OPTIONAL, -- Need R

 msgA-SubcarrierSpacing-r16 SubcarrierSpacing OPTIONAL, -- Cond 2StepOnlyL139

 msgA-RestrictedSetConfig-r16 ENUMERATED {unrestrictedSet, restrictedSetTypeA,

 restrictedSetTypeB} OPTIONAL, -- Cond 2StepOnly

 ra-PrioritizationForAccessIdentityTwoStep-r16 SEQUENCE {

 ra-Prioritization-r16 RA-Prioritization,

 ra-PrioritizationForAI-r16 BIT STRING (SIZE (2))

 } OPTIONAL, -- Cond InitialBWP-Only

 ra-ContentionResolutionTimer-r16 ENUMERATED {sf8, sf16, sf24, sf32, sf40, sf48, sf56, sf64} OPTIONAL, -- Cond 2StepOnly

 ...,

 [[

 ra-PrioritizationForSlicingTwoStep-r17 RA-PrioritizationForSlicing-r17 OPTIONAL -- Cond InitialBWP-Only

 ]]

}

GroupB-ConfiguredTwoStepRA-r16 ::= SEQUENCE {

 ra-MsgA-SizeGroupA ENUMERATED {b56, b144, b208, b256, b282, b480, b640, b800,

 b1000, b72, spare6, spare5, spare4, spare3, spare2, spare1},

 messagePowerOffsetGroupB ENUMERATED {minusinfinity, dB0, dB5, dB8, dB10, dB12, dB15, dB18},

 numberOfRA-PreamblesGroupA INTEGER (1..64)

}

-- TAG-RACH-CONFIGCOMMONTWOSTEPRA-STOP

-- ASN1STOP

|  |
| --- |
| *RACH-ConfigCommonTwoStepRA* field descriptions |
| ***groupB-ConfiguredTwoStepRA***Preamble grouping for 2-step random access type. If the field is absent then there is only one preamble group configured and only one msgA PUSCH configuration. |
| ***msgA-CB-PreamblesPerSSB-PerSharedRO***Number of contention-based preambles used for 2-step RA type from the non-CBRA 4-step type preambles associated with each SSB for RO shared with 4-step type RA. The number of preambles for 2-step RA type shall not exceed the number of preambles per SSB minus the number of contention-based preambles per SSB for 4-step type RA. The possible value range for this parameter needs to be aligned with value range for the configured SSBs per RACH occasion in *ssb-perRACH-OccasionAndCB-PreamblesPerSSB* in *RACH-ConfigCommon*. The field is only applicable for the case of shared ROs with 4-step type random access. |
| ***msgA-PRACH-RootSequenceIndex***PRACH root sequence index. If the field is not configured, the UE applies the value in field *prach-RootSequenceIndex* in *RACH-ConfigCommon* in the configured BWP. When both 2-step and 4-step type random access is configured, this field is only configured for the case of separate ROs between 2-step and 4-step type random access. |
| ***msgA-RestrictedSetConfig***Configuration of an unrestricted set or one of two types of restricted sets for 2-step random access type preamble. If the field is not configured, the UE applies the value in field *restrictedSetConfig* in *RACH-ConfigCommon* in the configured BWP. When both 2-step and 4-step type random access is configured, this field is only configured for the case of separate ROs between 2-step and 4-step type random access. |
| ***msgA-RSRP-Threshold***The UE selects 2-step random access type to perform random access based on this threshold (see TS 38.321 [3], clause 5.1.1). This field is only present if both 2-step and 4-step RA type are configured for the BWP. |
| ***msgA-RSRP-ThresholdSSB***UE may select the SS block and corresponding PRACH resource for path-loss estimation and (re)transmission based on SS blocks that satisfy the threshold (see TS 38.213 [13]). |
| ***msgA-SSB-PerRACH-OccasionAndCB-PreamblesPerSSB***The meaning of this field is twofold: the CHOICE conveys the information about the number of SSBs per RACH occasion. Value *oneEight* corresponds to one SSB associated with 8 RACH occasions, value *oneFourth* corresponds to one SSB associated with 4 RACH occasions, and so on. The ENUMERATED part indicates the number of Contention Based preambles per SSB. Value *n4* corresponds to 4 Contention Based preambles per SSB, value *n8* corresponds to 8 Contention Based preambles per SSB, and so on. The total number of CB preambles in a RACH occasion is given by *CB-preambles-per-SSB* \* max(1, *SSB-per-rach-occasion*). If the field is not configured and both 2-step and 4-step are configured for the BWP, the UE applies the value in the field *ssb-perRACH-OccasionAndCB-PreamblesPerSSB* in *RACH-ConfigCommon*. The field is not present when RACH occasions are shared between 2-step and 4-step type random access in the BWP. |
| ***msgA-SSB-SharedRO-MaskIndex***Indicates the subset of 4-step type ROs shared with 2-step random access type for each SSB. This field is configured when there is more than one RO per SSB. If the field is absent, and 4-step and 2-step has shared ROs, then all ROs are shared. |
| ***msgA-SubcarrierSpacing***Subcarrier spacing of PRACH (see TS 38.211 [16], clause 5.3.2). Only the values 15 or 30 kHz (FR1), and 60 or 120 kHz (FR2) are applicable. If the field is absent, the UE applies the SCS as derived from the *msgA-PRACH-ConfigurationIndex* in *RACH-ConfigGenericTwoStepRA* (see tables Table 6.3.3.1-1, Table 6.3.3.1-2, Table 6.3.3.2-2 and Table 6.3.3.2-3, TS 38.211 [16]) in case of 2-step only BWP, otherwise the UE applies the same SCS as Msg1 derived from *RACH-ConfigCommon*. The value also applies to contention free 2-step random access type (*RACH-ConfigDedicated*). |
| ***msgA-TotalNumberOfRA-Preambles***Indicates the total number of preambles used for contention-based and contention-free 2-step random access type when ROs for 2-step are not shared with 4-step. If the field is absent, and 2-step and 4-step does not have shared ROs, all 64 preambles are available for 2-step random access type. |
| ***msgA-TransMax***Max number of MsgA preamble transmissions performed before switching to 4-step random access (see TS 38.321 [3], clauses 5.1.1). This field is only applicable when 2-step and 4-step RA type are configured and switching to 4-step type RA is supported. If the field is absent, switching from 2-step RA type to 4-step RA type is not allowed. |
| ***ra-ContentionResolutionTimer***The initial value for the contention resolution timer for fallback RAR in case no 4-step random access type is configured (see TS 38.321 [3], clause 5.1.5). Value *sf8* corresponds to 8 subframes, value *sf16* corresponds to 16 subframes, and so on. If both 2-step and 4-step random access type resources are configured on the BWP, then this field is absent. |
| ***ra-Prioritization***Parameters which apply for prioritized random access procedure on any UL BWP of SpCell for specific Access Identities (see TS 38.321 [3], clause 5.1.1a). |
| ***ra-PrioritizationForAI***Indicates whether the field *ra-Prioritization-r16* applies for Access Identities. The first/leftmost bit corresponds to Access Identity 1, the next bit corresponds to Access Identity 2. Value *1* for an Access Identity indicates that the field *ra-Prioritization-r16* applies, otherwise the field does not apply. |
| ***rach-ConfigGenericTwoStepRA***2-step random access type parameters for both regular random access and beam failure recovery. |

|  |
| --- |
| *GroupB-ConfiguredTwoStepRA* field descriptions |
| ***messagePowerOffsetGroupB***Threshold for preamble selection. Value is in dB. Value *minusinfinity* corresponds to –infinity. Value *dB0* corresponds to 0 dB, *dB5* corresponds to 5 dB and so on. (see TS 38.321 [3], clause 5.1.1). |
| ***numberOfRA-PreamblesGroupA***The number of CB preambles per SSB in group A for idle/inactive or connected mode. The setting of the number of preambles for each group should be consistent with *msgA-SSB-PerRACH-OccasionAndCB-PreamblesPerSSB* or *msgA-CB-PreamblesPerSSB-PerSharedRO* if configured. |
| ***ra-MsgA-SizeGroupA***Transport block size threshold in bits below which the UE shall use a contention-based RA preamble of group A. (see TS 38.321 [3], clause 5.1.1). |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *2StepOnlyL139* | The field is mandatory present if *msgA-PRACH-RootSequenceIndex* L=139 and no 4-step random access type is configured, otherwise the field is absent, Need S. |
| *2StepOnly* | The field is mandatory present if there are no 4-step random access configurations configured in the BWP, i.e only 2-step random access type configured in the BWP, otherwise the field is optionally present, Need S. |
| *SharedRO* | The field is mandatory present if the 2-step random access type occasions are shared with 4-step random access type, otherwise the field is not present. |
| *2Step4Step* | The field is mandatory present if both 2-step random access type and 4-step random access type are configured in the BWP, otherwise the field is not present.  |
| *InitialBWP-Only* | This field is optionally present, Need R, if this BWP is the initial BWP of SpCell. Otherwise the field is absent. |

*<Next modification>*

### 6.3.2 Radio resource control information elements

*<Partially omitted>*

#### – *BWP-UplinkCommon*

The IE *BWP-UplinkCommon* is used to configure the common parameters of an uplink BWP. They are "cell specific" and the network ensures the necessary alignment with corresponding parameters of other UEs. The common parameters of the initial bandwidth part of the PCell are also provided via system information. For all other serving cells, the network provides the common parameters via dedicated signalling.

*BWP-UplinkCommon* information element

-- ASN1START

-- TAG-BWP-UPLINKCOMMON-START

BWP-UplinkCommon ::= SEQUENCE {

 genericParameters BWP,

 rach-ConfigCommon SetupRelease { RACH-ConfigCommon } OPTIONAL, -- Need M

 pusch-ConfigCommon SetupRelease { PUSCH-ConfigCommon } OPTIONAL, -- Need M

 pucch-ConfigCommon SetupRelease { PUCCH-ConfigCommon } OPTIONAL, -- Need M

 ...,

 [[

 rach-ConfigCommonIAB-r16 SetupRelease { RACH-ConfigCommon } OPTIONAL, -- Need M

 useInterlacePUCCH-PUSCH-r16 ENUMERATED {enabled} OPTIONAL, -- Need R

 msgA-ConfigCommon-r16 SetupRelease { MsgA-ConfigCommon-r16 } OPTIONAL -- Cond SpCellOnly2

 ]],

 [[

 enableRA-PrioritizationForSlicing-r17 BOOLEAN OPTIONAL -- Cond RAPrioSliceAI

 ]]

}

-- TAG-BWP-UPLINKCOMMON-STOP

-- ASN1STOP

|  |
| --- |
| *BWP-UplinkCommon* field descriptions |
| ***msgA-ConfigCommon***Configuration of the cell specific PRACH and PUSCH resource parameters for transmission of MsgA in 2-step random access type procedure. The NW can configure *msgA-ConfigCommon* only for UL BWPs if the linked DL BWPs (same bwp-Id as UL-BWP) are the initial DL BWPs or DL BWPs containing the SSB associated to the initial BL BWP |
| ***pucch-ConfigCommon***Cell specific parameters for the PUCCH of this BWP.  |
| ***pusch-ConfigCommon***Cell specific parameters for the PUSCH of this BWP. |
| ***rach-ConfigCommon***Configuration of cell specific random access parameters which the UE uses for contention based and contention free random access as well as for contention based beam failure recovery in this BWP. The NW configures SSB-based RA (and hence *RACH-ConfigCommon*) only for UL BWPs if the linked DL BWPs (same *bwp-Id* as UL-BWP) are the initial DL BWPs or DL BWPs containing the SSB associated to the initial DL BWP. The network configures *rach-ConfigCommon*, whenever it configures contention free random access (for reconfiguration with sync or for beam failure recovery).  |
| ***rach-ConfigCommonIAB***Configuration of cell specific random access parameters for the IAB-MT. The IAB specific IAB RACH configuration is used by IAB-MT, if configured. |
| ***useInterlacePUCCH-PUSCH***If the field is present, the UE uses uplink frequency domain resource allocation Type 2 for cell-specific PUSCH, e.g., PUSCH scheduled by RAR UL grant (see 38.213 clause 8.3 and 38.214 clause 6.1.2.2) and uses interlaced PUCCH Format 0 and 1 for cell-specific PUCCH (see TS 38.213 [13], clause 9.2.1). |
| ***enableRA-PrioritizationForSlicing***Indicates whether or not the random access prioritization for slicing should override the rra-PrioritizationForAccessIdentity. If value *TRUE* is configured, the UE should only apply the random access prioritization for slicing. If value *FALSE* is configured, the UE should only apply rra-PrioritizationForAccessIdentity. |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *SpCellOnly2* | The field is optionally present, Need M, in the *BWP-UplinkCommon* of an SpCell. It is absent otherwise.  |
| *RAPrioSliceAI* | The field is optionally present, Need M, if both parameters ra-PrioritizationForAccessIdentity and the random access prioritization for slicing are included. It is absent otherwise. |

*<Next modification>*

#### – *FreqPriorityListNRForSlicing*

The *FreqPriorityListNRForSlicing* indicates cell reselection priorities for slicing.

*FreqPriorityListNRForSlicing* information element

-- ASN1START

-- TAG-FREQPRIORITYLISTNRFORSLICING-START

FreqPriorityListNRForSlicing-r17 ::= SEQUENCE (SIZE (1..maxFreqForSlicing)) OF FreqPriorityNRForSlicing-r17

FreqPriorityNRForSlicing-r17 ::= SEQUENCE {

 carrierFreq ARFCN-ValueNR,

 sliceInfoList-r17 SliceInfoList-r17,

 ...

}

SliceInfoList-r17 ::= SEQUENCE (SIZE (1..maxSliceInfo-r17)) OF SliceInfo-r17

SliceInfo-r17 ::= SEQUENCE {

sliceGroupID-r17 FFS,

 cellReselectionPriority CellReselectionPriority OPTIONAL, -- Need R

 cellReselectionSubPriority CellReselectionSubPriority OPTIONAL, -- Need R

 sliceAllowCellListNR-r17 SliceCellListNR-r17 OPTIONAL, -- Need R

 sliceExcludeCellListNR-r17 SliceCellListNR-r17 OPTIONAL, -- Need R

 ...

}

SliceCellListNR-r17 ::= SEQUENCE (SIZE (1..maxCellSlice-r17)) OF SliceCellInfoNR

SliceCellInfoNR-r17 ::= SEQUENCE {

 physCellId PhysCellId,

 ...

}

-- TAG-FREQPRIORITYLISTNRFORSLICING-STOP

-- ASN1STOP

| *FreqPriorityListNRForSlicing* field descriptions |
| --- |
| ***sliceAllowCellListNR***Indicates the list of allow-listed neighbouring cells for slicing. This field is optional present, need R, only when *sliceExcludeCellListNR* is absent. |
| ***sliceExcludeCellListNR***Indicates the list of exclude-listed neighbouring cells for slicing. This field is optional present, need R, only when *sliceAllowCellListNR* is absent. |

*<Next modification>*

#### – *RA-PrioritizationForSlicing*

The IE *RA-PrioritizationForSlicing* is used to configure prioritized random access for slicing.

*RA-PrioritizationForSlicing* information element

-- ASN1START

-- TAG-RA-PRIORITIZATIONFORSLICING-START

RA-PrioritizationForSlicing-r17 ::= SEQUENCE {

 ra-PrioritizationSliceInfoList-r17 RA-PrioritizationSliceInfoList-r17,

 ...

}

RA-PrioritizationSliceInfoList-r17 ::= SEQUENCE (SIZE (1..maxSliceInfo-r17)) OF RA-PrioritizationSliceInfo-r17

RA-PrioritizationSliceInfo-r17 ::= SEQUENCE {

 sliceGroupID-r17 FFS,

 ra-Prioritization RA-Prioritization,

 ...

}

-- TAG-RA-PRIORITIZATIONFORSLICING-STOP

-- ASN1STOP

*<Next modification>*

## 6.4 RRC multiplicity and type constraint values

### – Multiplicity and type constraint definitions

-- ASN1START

-- TAG-MULTIPLICITY-AND-TYPE-CONSTRAINT-DEFINITIONS-START

maxAI-DCI-PayloadSize-r16 INTEGER ::= 128 --Maximum size of the DCI payload scrambled with ai-RNTI

maxAI-DCI-PayloadSize-1-r16 INTEGER ::= 127 --Maximum size of the DCI payload scrambled with ai-RNTI minus 1

maxBandComb INTEGER ::= 65536 -- Maximum number of DL band combinations

maxBandsUTRA-FDD-r16 INTEGER ::= 64 -- Maximum number of bands listed in UTRA-FDD UE caps

maxBH-RLC-ChannelID-r16 INTEGER ::= 65536 -- Maximum value of BH RLC Channel ID

maxBT-IdReport-r16 INTEGER ::= 32 -- Maximum number of Bluetooth IDs to report

maxBT-Name-r16 INTEGER ::= 4 -- Maximum number of Bluetooth name

maxCAG-Cell-r16 INTEGER ::= 16 -- Maximum number of NR CAG cell ranges in SIB3, SIB4

maxTwoPUCCH-Grp-ConfigList-r16 INTEGER ::= 32 -- Maximum number of supported configuration(s) of {primary PUCCH group

 -- config, secondary PUCCH group config}

maxCBR-Config-r16 INTEGER ::= 8 -- Maximum number of CBR range configurations for sidelink communication

 -- congestion control

maxCBR-Config-1-r16 INTEGER ::= 7 -- Maximum number of CBR range configurations for sidelink communication

 -- congestion control minus 1

maxCBR-Level-r16 INTEGER ::= 16 -- Maximum number of CBR levels

maxCBR-Level-1-r16 INTEGER ::= 15 -- Maximum number of CBR levels minus 1

maxCellBlack INTEGER ::= 16 -- Maximum number of NR blacklisted cell ranges in SIB3, SIB4

maxCellGroupings-r16 INTEGER ::= 32 -- Maximum number of cell groupings for NR-DC

maxCellHistory-r16 INTEGER ::= 16 -- Maximum number of visited cells reported

maxCellInter INTEGER ::= 16 -- Maximum number of inter-Freq cells listed in SIB4

maxCellIntra INTEGER ::= 16 -- Maximum number of intra-Freq cells listed in SIB3

maxCellMeasEUTRA INTEGER ::= 32 -- Maximum number of cells in E-UTRAN

maxCellMeasIdle-r16 INTEGER ::= 8 -- Maximum number of cells per carrier for idle/inactive measurements

maxCellMeasUTRA-FDD-r16 INTEGER ::= 32 -- Maximum number of cells in FDD UTRAN

maxCellWhite INTEGER ::= 16 -- Maximum number of NR whitelisted cell ranges in SIB3, SIB4

maxEARFCN INTEGER ::= 262143 -- Maximum value of E-UTRA carrier frequency

maxEUTRA-CellBlack INTEGER ::= 16 -- Maximum number of E-UTRA blacklisted physical cell identity ranges

 -- in SIB5

maxEUTRA-NS-Pmax INTEGER ::= 8 -- Maximum number of NS and P-Max values per band

maxLogMeasReport-r16 INTEGER ::= 520 -- Maximum number of entries for logged measurements

maxMultiBands INTEGER ::= 8 -- Maximum number of additional frequency bands that a cell belongs to

maxNARFCN INTEGER ::= 3279165 -- Maximum value of NR carrier frequency

maxNR-NS-Pmax INTEGER ::= 8 -- Maximum number of NS and P-Max values per band

maxFreqIdle-r16 INTEGER ::= 8 -- Maximum number of carrier frequencies for idle/inactive measurements

maxNrofServingCells INTEGER ::= 32 -- Max number of serving cells (SpCells + SCells)

maxNrofServingCells-1 INTEGER ::= 31 -- Max number of serving cells (SpCells + SCells) minus 1

maxNrofAggregatedCellsPerCellGroup INTEGER ::= 16

maxNrofAggregatedCellsPerCellGroupMinus4-r16 INTEGER ::= 12

maxNrofDUCells-r16 INTEGER ::= 512 -- Max number of cells configured on the collocated IAB-DU

maxNrofAvailabilityCombinationsPerSet-r16 INTEGER ::= 512 -- Max number of AvailabilityCombinationId used in the DCI format 2\_5

maxNrofAvailabilityCombinationsPerSet-1-r16 INTEGER ::= 511 -- Max number of AvailabilityCombinationId used in the DCI format 2\_5 minus 1

maxNrofSCells INTEGER ::= 31 -- Max number of secondary serving cells per cell group

maxNrofCellMeas INTEGER ::= 32 -- Maximum number of entries in each of the cell lists in a measurement object

maxNrofCG-SL-r16 INTEGER ::= 8 -- Max number of sidelink configured grant

maxNrofCG-SL-1-r16 INTEGER ::= 7 -- Max number of sidelink configured grant minus 1

maxNrofSS-BlocksToAverage INTEGER ::= 16 -- Max number for the (max) number of SS blocks to average to determine cell measurement

maxNrofCondCells-r16 INTEGER ::= 8 -- Max number of conditional candidate SpCells

maxNrofCSI-RS-ResourcesToAverage INTEGER ::= 16 -- Max number for the (max) number of CSI-RS to average to determine cell measurement

maxNrofDL-Allocations INTEGER ::= 16 -- Maximum number of PDSCH time domain resource allocations

maxNrofSR-ConfigPerCellGroup INTEGER ::= 8 -- Maximum number of SR configurations per cell group

maxLCG-ID INTEGER ::= 7 -- Maximum value of LCG ID

maxLC-ID INTEGER ::= 32 -- Maximum value of Logical Channel ID

maxLC-ID-Iab-r16 INTEGER ::= 65855 -- Maximum value of BH Logical Channel ID extension

maxLTE-CRS-Patterns-r16 INTEGER ::= 3 -- Maximum number of additional LTE CRS rate matching patterns

maxNrofTAGs INTEGER ::= 4 -- Maximum number of Timing Advance Groups

maxNrofTAGs-1 INTEGER ::= 3 -- Maximum number of Timing Advance Groups minus 1

maxNrofBWPs INTEGER ::= 4 -- Maximum number of BWPs per serving cell

maxNrofCombIDC INTEGER ::= 128 -- Maximum number of reported MR-DC combinations for IDC

maxNrofSymbols-1 INTEGER ::= 13 -- Maximum index identifying a symbol within a slot (14 symbols, indexed from 0..13)

maxNrofSlots INTEGER ::= 320 -- Maximum number of slots in a 10 ms period

maxNrofSlots-1 INTEGER ::= 319 -- Maximum number of slots in a 10 ms period minus 1

maxNrofPhysicalResourceBlocks INTEGER ::= 275 -- Maximum number of PRBs

maxNrofPhysicalResourceBlocks-1 INTEGER ::= 274 -- Maximum number of PRBs minus 1

maxNrofPhysicalResourceBlocksPlus1 INTEGER ::= 276 -- Maximum number of PRBs plus 1

maxNrofControlResourceSets INTEGER ::= 12 -- Max number of CoReSets configurable on a serving cell

maxNrofControlResourceSets-1 INTEGER ::= 11 -- Max number of CoReSets configurable on a serving cell minus 1

maxNrofControlResourceSets-1-r16 INTEGER ::= 15 -- Max number of CoReSets configurable on a serving cell extended in minus 1

maxNrofCoresetPools-r16 INTEGER ::= 2 -- Maximum number of CORESET pools

maxCoReSetDuration INTEGER ::= 3 -- Max number of OFDM symbols in a control resource set

maxNrofSearchSpaces-1 INTEGER ::= 39 -- Max number of Search Spaces minus 1

maxSFI-DCI-PayloadSize INTEGER ::= 128 -- Max number payload of a DCI scrambled with SFI-RNTI

maxSFI-DCI-PayloadSize-1 INTEGER ::= 127 -- Max number payload of a DCI scrambled with SFI-RNTI minus 1

maxIAB-IP-Address-r16 INTEGER ::= 32 -- Max number of assigned IP addresses

maxINT-DCI-PayloadSize INTEGER ::= 126 -- Max number payload of a DCI scrambled with INT-RNTI

maxINT-DCI-PayloadSize-1 INTEGER ::= 125 -- Max number payload of a DCI scrambled with INT-RNTI minus 1

maxNrofRateMatchPatterns INTEGER ::= 4 -- Max number of rate matching patterns that may be configured

maxNrofRateMatchPatterns-1 INTEGER ::= 3 -- Max number of rate matching patterns that may be configured minus 1

maxNrofRateMatchPatternsPerGroup INTEGER ::= 8 -- Max number of rate matching patterns that may be configured in one group

maxNrofCSI-ReportConfigurations INTEGER ::= 48 -- Maximum number of report configurations

maxNrofCSI-ReportConfigurations-1 INTEGER ::= 47 -- Maximum number of report configurations minus 1

maxNrofCSI-ResourceConfigurations INTEGER ::= 112 -- Maximum number of resource configurations

maxNrofCSI-ResourceConfigurations-1 INTEGER ::= 111 -- Maximum number of resource configurations minus 1

maxNrofAP-CSI-RS-ResourcesPerSet INTEGER ::= 16

maxNrOfCSI-AperiodicTriggers INTEGER ::= 128 -- Maximum number of triggers for aperiodic CSI reporting

maxNrofReportConfigPerAperiodicTrigger INTEGER ::= 16 -- Maximum number of report configurations per trigger state for aperiodic reporting

maxNrofNZP-CSI-RS-Resources INTEGER ::= 192 -- Maximum number of Non-Zero-Power (NZP) CSI-RS resources

maxNrofNZP-CSI-RS-Resources-1 INTEGER ::= 191 -- Maximum number of Non-Zero-Power (NZP) CSI-RS resources minus 1

maxNrofNZP-CSI-RS-ResourcesPerSet INTEGER ::= 64 -- Maximum number of NZP CSI-RS resources per resource set

maxNrofNZP-CSI-RS-ResourceSets INTEGER ::= 64 -- Maximum number of NZP CSI-RS resource sets per cell

maxNrofNZP-CSI-RS-ResourceSets-1 INTEGER ::= 63 -- Maximum number of NZP CSI-RS resource sets per cell minus 1

maxNrofNZP-CSI-RS-ResourceSetsPerConfig INTEGER ::= 16 -- Maximum number of resource sets per resource configuration

maxNrofNZP-CSI-RS-ResourcesPerConfig INTEGER ::= 128 -- Maximum number of resources per resource configuration

maxNrofZP-CSI-RS-Resources INTEGER ::= 32 -- Maximum number of Zero-Power (ZP) CSI-RS resources

maxNrofZP-CSI-RS-Resources-1 INTEGER ::= 31 -- Maximum number of Zero-Power (ZP) CSI-RS resources minus 1

maxNrofZP-CSI-RS-ResourceSets-1 INTEGER ::= 15

maxNrofZP-CSI-RS-ResourcesPerSet INTEGER ::= 16

maxNrofZP-CSI-RS-ResourceSets INTEGER ::= 16

maxNrofCSI-IM-Resources INTEGER ::= 32 -- Maximum number of CSI-IM resources

maxNrofCSI-IM-Resources-1 INTEGER ::= 31 -- Maximum number of CSI-IM resources minus 1

maxNrofCSI-IM-ResourcesPerSet INTEGER ::= 8 -- Maximum number of CSI-IM resources per set

maxNrofCSI-IM-ResourceSets INTEGER ::= 64 -- Maximum number of NZP CSI-IM resource sets per cell

maxNrofCSI-IM-ResourceSets-1 INTEGER ::= 63 -- Maximum number of NZP CSI-IM resource sets per cell minus 1

maxNrofCSI-IM-ResourceSetsPerConfig INTEGER ::= 16 -- Maximum number of CSI IM resource sets per resource configuration

maxNrofCSI-SSB-ResourcePerSet INTEGER ::= 64 -- Maximum number of SSB resources in a resource set

maxNrofCSI-SSB-ResourceSets INTEGER ::= 64 -- Maximum number of CSI SSB resource sets per cell

maxNrofCSI-SSB-ResourceSets-1 INTEGER ::= 63 -- Maximum number of CSI SSB resource sets per cell minus 1

maxNrofCSI-SSB-ResourceSetsPerConfig INTEGER ::= 1 -- Maximum number of CSI SSB resource sets per resource configuration

maxNrofFailureDetectionResources INTEGER ::= 10 -- Maximum number of failure detection resources

maxNrofFailureDetectionResources-1 INTEGER ::= 9 -- Maximum number of failure detection resources minus 1

maxNrofFreqSL-r16 INTEGER ::= 8 -- Maximum number of carrier frequency for NR sidelink communication

maxNrofSL-BWPs-r16 INTEGER ::= 4 -- Maximum number of BWP for NR sidelink communication

maxFreqSL-EUTRA-r16 INTEGER ::= 8 -- Maximum number of EUTRA anchor carrier frequency for NR sidelink communication

maxNrofSL-MeasId-r16 INTEGER ::= 64 -- Maximum number of sidelink measurement identity (RSRP) per destination

maxNrofSL-ObjectId-r16 INTEGER ::= 64 -- Maximum number of sidelink measurement objects (RSRP) per destination

maxNrofSL-ReportConfigId-r16 INTEGER ::= 64 -- Maximum number of sidelink measurement reporting configuration(RSRP) per destination

maxNrofSL-PoolToMeasureNR-r16 INTEGER ::= 8 -- Maximum number of resource pool for NR sidelink measurement to measure for

 -- each measurement object (for CBR)

maxFreqSL-NR-r16 INTEGER ::= 8 -- Maximum number of NR anchor carrier frequency for NR sidelink communication

maxNrofSL-QFIs-r16 INTEGER ::= 2048 -- Maximum number of QoS flow for NR sidelink communication per UE

maxNrofSL-QFIsPerDest-r16 INTEGER ::= 64 -- Maximum number of QoS flow per destination for NR sidelink communication

maxNrofObjectId INTEGER ::= 64 -- Maximum number of measurement objects

maxNrofPageRec INTEGER ::= 32 -- Maximum number of page records

maxNrofPCI-Ranges INTEGER ::= 8 -- Maximum number of PCI ranges

maxPLMN INTEGER ::= 12 -- Maximum number of PLMNs broadcast and reported by UE at establishment

maxNrofCSI-RS-ResourcesRRM INTEGER ::= 96 -- Maximum number of CSI-RS resources per cell for an RRM measurement object

maxNrofCSI-RS-ResourcesRRM-1 INTEGER ::= 95 -- Maximum number of CSI-RS resources per cell for an RRM measurement object minus 1

maxNrofMeasId INTEGER ::= 64 -- Maximum number of configured measurements

maxNrofQuantityConfig INTEGER ::= 2 -- Maximum number of quantity configurations

maxNrofCSI-RS-CellsRRM INTEGER ::= 96 -- Maximum number of cells with CSI-RS resources for an RRM measurement object

maxNrofSL-Dest-r16 INTEGER ::= 32 -- Maximum number of destination for NR sidelink communication

maxNrofSL-Dest-1-r16 INTEGER ::= 31 -- Highest index of destination for NR sidelink communication

maxNrofSLRB-r16 INTEGER ::= 512 -- Maximum number of radio bearer for NR sidelink communication per UE

maxSL-LCID-r16 INTEGER ::= 512 -- Maximum number of RLC bearer for NR sidelink communication per UE

maxSL-SyncConfig-r16 INTEGER ::= 16 -- Maximum number of sidelink Sync configurations

maxNrofRXPool-r16 INTEGER ::= 16 -- Maximum number of Rx resource pool for NR sidelink communication

maxNrofTXPool-r16 INTEGER ::= 8 -- Maximum number of Tx resource pool for NR sidelink communication

maxNrofPoolID-r16 INTEGER ::= 16 -- Maximum index of resource pool for NR sidelink communication

maxNrofSRS-PathlossReferenceRS-r16 INTEGER ::= 64 -- Maximum number of RSs used as pathloss reference for SRS power control.

maxNrofSRS-PathlossReferenceRS-1-r16 INTEGER ::= 63 -- Maximum number of RSs used as pathloss reference for SRS power control minus 1.

maxNrofSRS-ResourceSets INTEGER ::= 16 -- Maximum number of SRS resource sets in a BWP.

maxNrofSRS-ResourceSets-1 INTEGER ::= 15 -- Maximum number of SRS resource sets in a BWP minus 1.

maxNrofSRS-PosResourceSets-r16 INTEGER ::= 16 -- Maximum number of SRS Positioning resource sets in a BWP.

maxNrofSRS-PosResourceSets-1-r16 INTEGER ::= 15 -- Maximum number of SRS Positioning resource sets in a BWP minus 1.

maxNrofSRS-Resources INTEGER ::= 64 -- Maximum number of SRS resources.

maxNrofSRS-Resources-1 INTEGER ::= 63 -- Maximum number of SRS resources minus 1.

maxNrofSRS-PosResources-r16 INTEGER ::= 64 -- Maximum number of SRS Positioning resources.

maxNrofSRS-PosResources-1-r16 INTEGER ::= 63 -- Maximum number of SRS Positioning resources in an SRS Positioning

 -- resource set minus 1.

maxNrofSRS-ResourcesPerSet INTEGER ::= 16 -- Maximum number of SRS resources in an SRS resource set

maxNrofSRS-TriggerStates-1 INTEGER ::= 3 -- Maximum number of SRS trigger states minus 1, i.e., the largest code point.

maxNrofSRS-TriggerStates-2 INTEGER ::= 2 -- Maximum number of SRS trigger states minus 2.

maxRAT-CapabilityContainers INTEGER ::= 8 -- Maximum number of interworking RAT containers (incl NR and MRDC)

maxSimultaneousBands INTEGER ::= 32 -- Maximum number of simultaneously aggregated bands

maxULTxSwitchingBandPairs INTEGER ::= 32 -- Maximum number of band pairs supporting dynamic UL Tx switching in a band combination

maxNrofSlotFormatCombinationsPerSet INTEGER ::= 512 -- Maximum number of Slot Format Combinations in a SF-Set.

maxNrofSlotFormatCombinationsPerSet-1 INTEGER ::= 511 -- Maximum number of Slot Format Combinations in a SF-Set minus 1.

maxNrofTrafficPattern-r16 INTEGER ::= 8 -- Maximum number of Traffic Pattern for NR sidelink communication.

maxNrofPUCCH-Resources INTEGER ::= 128

maxNrofPUCCH-Resources-1 INTEGER ::= 127

maxNrofPUCCH-ResourceSets INTEGER ::= 4 -- Maximum number of PUCCH Resource Sets

maxNrofPUCCH-ResourceSets-1 INTEGER ::= 3 -- Maximum number of PUCCH Resource Sets minus 1.

maxNrofPUCCH-ResourcesPerSet INTEGER ::= 32 -- Maximum number of PUCCH Resources per PUCCH-ResourceSet

maxNrofPUCCH-P0-PerSet INTEGER ::= 8 -- Maximum number of P0-pucch present in a p0-pucch set

maxNrofPUCCH-PathlossReferenceRSs INTEGER ::= 4 -- Maximum number of RSs used as pathloss reference for PUCCH power control.

maxNrofPUCCH-PathlossReferenceRSs-1 INTEGER ::= 3 -- Maximum number of RSs used as pathloss reference for PUCCH power control minus 1.

maxNrofPUCCH-PathlossReferenceRSs-r16 INTEGER ::= 64 -- Maximum number of RSs used as pathloss reference for PUCCH power control extended.

maxNrofPUCCH-PathlossReferenceRSs-1-r16 INTEGER ::= 63 -- Maximum number of RSs used as pathloss reference for PUCCH power control

 -- minus 1 extended.

maxNrofPUCCH-PathlossReferenceRSsDiff-r16 INTEGER ::= 60 -- Difference between the extended maximum and the non-extended maximum

maxNrofPUCCH-ResourceGroups-r16 INTEGER ::= 4 -- Maximum number of PUCCH resources groups.

maxNrofPUCCH-ResourcesPerGroup-r16 INTEGER ::= 128 -- Maximum number of PUCCH resources in a PUCCH group.

maxNrofMultiplePUSCHs-r16 INTEGER ::= 8 -- Maximum number of multiple PUSCHs in PUSCH TDRA list

maxNrofP0-PUSCH-AlphaSets INTEGER ::= 30 -- Maximum number of P0-pusch-alpha-sets (see TS 38.213 [13], clause 7.1)

maxNrofP0-PUSCH-AlphaSets-1 INTEGER ::= 29 -- Maximum number of P0-pusch-alpha-sets minus 1 (see TS 38.213 [13], clause 7.1)

maxNrofPUSCH-PathlossReferenceRSs INTEGER ::= 4 -- Maximum number of RSs used as pathloss reference for PUSCH power control.

maxNrofPUSCH-PathlossReferenceRSs-1 INTEGER ::= 3 -- Maximum number of RSs used as pathloss reference for PUSCH power control minus 1.

maxNrofPUSCH-PathlossReferenceRSs-r16 INTEGER ::= 64 -- Maximum number of RSs used as pathloss reference for PUSCH power control extended

maxNrofPUSCH-PathlossReferenceRSs-1-r16 INTEGER ::= 63 -- Maximum number of RSs used as pathloss reference for PUSCH power control

 -- extended minus 1

maxNrofPUSCH-PathlossReferenceRSsDiff-r16 INTEGER ::= 60 -- Difference between maxNrofPUSCH-PathlossReferenceRSs-r16 and

 -- maxNrofPUSCH-PathlossReferenceRSs

maxNrofNAICS-Entries INTEGER ::= 8 -- Maximum number of supported NAICS capability set

maxBands INTEGER ::= 1024 -- Maximum number of supported bands in UE capability.

maxBandsMRDC INTEGER ::= 1280

maxBandsEUTRA INTEGER ::= 256

maxCellReport INTEGER ::= 8

maxDRB INTEGER ::= 29 -- Maximum number of DRBs (that can be added in DRB-ToAddModList).

maxFreq INTEGER ::= 8 -- Max number of frequencies.

maxFreqLayers INTEGER ::= 4 -- Max number of frequency layers.

maxFreqIDC-r16 INTEGER ::= 128 -- Max number of frequencies for IDC indication.

maxCombIDC-r16 INTEGER ::= 128 -- Max number of reported UL CA for IDC indication.

maxFreqIDC-MRDC INTEGER ::= 32 -- Maximum number of candidate NR frequencies for MR-DC IDC indication

maxNrofCandidateBeams INTEGER ::= 16 -- Max number of PRACH-ResourceDedicatedBFR in BFR config.

maxNrofCandidateBeams-r16 INTEGER ::= 64 -- Max number of candidate beam resources in BFR config.

maxNrofCandidateBeamsExt-r16 INTEGER ::= 48 -- Max number of PRACH-ResourceDedicatedBFR in the CandidateBeamRSListExt

maxNrofPCIsPerSMTC INTEGER ::= 64 -- Maximum number of PCIs per SMTC.

maxNrofQFIs INTEGER ::= 64

maxNrofResourceAvailabilityPerCombination-r16 INTEGER ::= 256

maxNrOfSemiPersistentPUSCH-Triggers INTEGER ::= 64 -- Maximum number of triggers for semi persistent reporting on PUSCH

maxNrofSR-Resources INTEGER ::= 8 -- Maximum number of SR resources per BWP in a cell.

maxNrofSlotFormatsPerCombination INTEGER ::= 256

maxNrofSpatialRelationInfos INTEGER ::= 8

maxNrofSpatialRelationInfos-plus-1 INTEGER ::= 9

maxNrofSpatialRelationInfos-r16 INTEGER ::= 64

maxNrofSpatialRelationInfosDiff-r16 INTEGER ::= 56 -- Difference between maxNrofSpatialRelationInfos-r16 and maxNrofSpatialRelationInfos

maxNrofIndexesToReport INTEGER ::= 32

maxNrofIndexesToReport2 INTEGER ::= 64

maxNrofSSBs-r16 INTEGER ::= 64 -- Maximum number of SSB resources in a resource set.

maxNrofSSBs-1 INTEGER ::= 63 -- Maximum number of SSB resources in a resource set minus 1.

maxNrofS-NSSAI INTEGER ::= 8 -- Maximum number of S-NSSAI.

maxNrofTCI-StatesPDCCH INTEGER ::= 64

maxNrofTCI-States INTEGER ::= 128 -- Maximum number of TCI states.

maxNrofTCI-States-1 INTEGER ::= 127 -- Maximum number of TCI states minus 1.

maxNrofUL-Allocations INTEGER ::= 16 -- Maximum number of PUSCH time domain resource allocations.

maxQFI INTEGER ::= 63

maxRA-CSIRS-Resources INTEGER ::= 96

maxRA-OccasionsPerCSIRS INTEGER ::= 64 -- Maximum number of RA occasions for one CSI-RS

maxRA-Occasions-1 INTEGER ::= 511 -- Maximum number of RA occasions in the system

maxRA-SSB-Resources INTEGER ::= 64

maxSCSs INTEGER ::= 5

maxSecondaryCellGroups INTEGER ::= 3

maxNrofServingCellsEUTRA INTEGER ::= 32

maxMBSFN-Allocations INTEGER ::= 8

maxNrofMultiBands INTEGER ::= 8

maxCellSFTD INTEGER ::= 3 -- Maximum number of cells for SFTD reporting

maxReportConfigId INTEGER ::= 64

maxNrofCodebooks INTEGER ::= 16 -- Maximum number of codebooks supported by the UE

maxNrofCSI-RS-ResourcesExt-r16 INTEGER ::= 16 -- Maximum number of codebook resources supported by the UE for eType2/Codebook combo

maxNrofCSI-RS-Resources INTEGER ::= 7 -- Maximum number of codebook resources supported by the UE

maxNrofCSI-RS-ResourcesAlt-r16 INTEGER ::= 512 -- Maximum number of alternative codebook resources supported by the UE

maxNrofCSI-RS-ResourcesAlt-1-r16 INTEGER ::= 511 -- Maximum number of alternative codebook resources supported by the UE minus 1

maxNrofSRI-PUSCH-Mappings INTEGER ::= 16

maxNrofSRI-PUSCH-Mappings-1 INTEGER ::= 15

maxSIB INTEGER::= 32 -- Maximum number of SIBs

maxSI-Message INTEGER::= 32 -- Maximum number of SI messages

maxPO-perPF INTEGER ::= 4 -- Maximum number of paging occasion per paging frame

maxAccessCat-1 INTEGER ::= 63 -- Maximum number of Access Categories minus 1

maxBarringInfoSet INTEGER ::= 8 -- Maximum number of access control parameter sets

maxCellEUTRA INTEGER ::= 8 -- Maximum number of E-UTRA cells in SIB list

maxEUTRA-Carrier INTEGER ::= 8 -- Maximum number of E-UTRA carriers in SIB list

maxPLMNIdentities INTEGER ::= 8 -- Maximum number of PLMN identities in RAN area configurations

maxDownlinkFeatureSets INTEGER ::= 1024 -- (for NR DL) Total number of FeatureSets (size of the pool)

maxUplinkFeatureSets INTEGER ::= 1024 -- (for NR UL) Total number of FeatureSets (size of the pool)

maxEUTRA-DL-FeatureSets INTEGER ::= 256 -- (for E-UTRA) Total number of FeatureSets (size of the pool)

maxEUTRA-UL-FeatureSets INTEGER ::= 256 -- (for E-UTRA) Total number of FeatureSets (size of the pool)

maxFeatureSetsPerBand INTEGER ::= 128 -- (for NR) The number of feature sets associated with one band.

maxPerCC-FeatureSets INTEGER ::= 1024 -- (for NR) Total number of CC-specific FeatureSets (size of the pool)

maxFeatureSetCombinations INTEGER ::= 1024 -- (for MR-DC/NR)Total number of Feature set combinations (size of the pool)

maxInterRAT-RSTD-Freq INTEGER ::= 3

maxHRNN-Len-r16 INTEGER ::= 48 -- Maximum length of HRNNs

maxNPN-r16 INTEGER ::= 12 -- Maximum number of NPNs broadcast and reported by UE at establishment

maxNrOfMinSchedulingOffsetValues-r16 INTEGER ::= 2 -- Maximum number of min. scheduling offset (K0/K2) configurations

maxK0-SchedulingOffset-r16 INTEGER ::= 16 -- Maximum number of slots configured as min. scheduling offset (K0)

maxK2-SchedulingOffset-r16 INTEGER ::= 16 -- Maximum number of slots configured as min. scheduling offset (K2)

maxDCI-2-6-Size-r16 INTEGER ::= 140 -- Maximum size of DCI format 2-6

maxDCI-2-6-Size-1-r16 INTEGER ::= 139 -- Maximum DCI format 2-6 size minus 1

maxNrofUL-Allocations-r16 INTEGER ::= 64 -- Maximum number of PUSCH time domain resource allocations

maxNrofP0-PUSCH-Set-r16 INTEGER ::= 2 -- Maximum number of P0 PUSCH set(s)

maxOnDemandSIB-r16 INTEGER ::= 8 -- Maximum number of SIB(s) that can be requested on-demand

maxOnDemandPosSIB-r16 INTEGER ::= 32 -- Maximum number of posSIB(s) that can be requested on-demand

maxCI-DCI-PayloadSize-r16 INTEGER ::= 126 -- Maximum number of the DCI size for CI

maxCI-DCI-PayloadSize-1-r16 INTEGER ::= 125 -- Maximum number of the DCI size for CI minus 1

maxWLAN-Id-Report-r16 INTEGER ::= 32 -- Maximum number of WLAN IDs to report

maxWLAN-Name-r16 INTEGER ::= 4 -- Maximum number of WLAN name

maxRAReport-r16 INTEGER ::= 8 -- Maximum number of RA procedures information to be included in the RA report

maxTxConfig-r16 INTEGER ::= 64 -- Maximum number of sidelink transmission parameters configurations

maxTxConfig-1-r16 INTEGER ::= 63 -- Maximum number of sidelink transmission parameters configurations minus 1

maxPSSCH-TxConfig-r16 INTEGER ::= 16 -- Maximum number of PSSCH TX configurations

maxNrofCLI-RSSI-Resources-r16 INTEGER ::= 64 -- Maximum number of CLI-RSSI resources for UE

maxNrofCLI-RSSI-Resources-1-r16 INTEGER ::= 63 -- Maximum number of CLI-RSSI resources for UE minus 1

maxNrofCLI-SRS-Resources-r16 INTEGER ::= 32 -- Maximum number of SRS resources for CLI measurement for UE

maxCLI-Report-r16 INTEGER ::= 8

maxNrofConfiguredGrantConfig-r16 INTEGER ::= 12 -- Maximum number of configured grant configurations per BWP

maxNrofConfiguredGrantConfig-1-r16 INTEGER ::= 11 -- Maximum number of configured grant configurations per BWP minus 1

maxNrofCG-Type2DeactivationState INTEGER ::= 16 -- Maximum number of deactivation state for type 2 configured grants per BWP

maxNrofConfiguredGrantConfigMAC-1-r16 INTEGER ::= 31 -- Maximum number of configured grant configurations per MAC entity minus 1

maxNrofSPS-Config-r16 INTEGER ::= 8 -- Maximum number of SPS configurations per BWP

maxNrofSPS-Config-1-r16 INTEGER ::= 7 -- Maximum number of SPS configurations per BWP minus 1

maxNrofSPS-DeactivationState INTEGER ::= 16 -- Maximum number of deactivation state for SPS per BWP

maxNrofDormancyGroups INTEGER ::= 5 --

maxNrofPUCCH-ResourceGroups-1-r16 INTEGER ::= 3 --

maxNrofServingCellsTCI-r16 INTEGER ::= 32 -- Maximum number of serving cells in simultaneousTCI-UpdateList

maxNrofTxDC-TwoCarrier-r16 INTEGER ::= 64 -- Maximum number of UL Tx DC locations reported by the UE for 2CC uplink CA

maxFreqForSlicing-r17 INTEGER ::= FFS -- Maximum number of frequencies for one slice group

maxSliceInfo-r17 INTEGER ::= FFS -- Maximum number of slice groups

maxCellSlice-r17 INTEGER ::= FFS -- Maximum number of cells supporting the slice group

-- TAG-MULTIPLICITY-AND-TYPE-CONSTRAINT-DEFINITIONS-STOP

-- ASN1STOP

### – End of NR-RRC-Definitions

-- ASN1START

END

-- ASN1STOP

# RAN2 agreements on RAN slicing

## **RAN2#117-e agreements**

Slice based cell reselection

* 1: RAN2 confirm the working assumption on option A without formula.
* 2: The UE should determine the frequency priority order according to the following rules:

a) Considering the slice/slice group priority provided by NAS, the frequencies that support higher priority slice/slice group have higher slice based frequency priority than the frequencies that support lower priority slice/slice group;

b) Among the frequencies supporting a slice/slice group with the same priority, the UE should follow the slice specific frequency priority received in SIB or RRCRelease (if configured);

c) Among the frequencies supporting the same slice/slice group, the frequency not configured with slice specific reselection priority should be considered as lower priority than other frequencies configured with slice specific reselection priority;

d) The frequencies that support any slice/slice group have higher slice based frequency priority than the frequencies that support none of slice/slice group;

e) For the frequencies that do not support any slice/slice group, the UE should follow the legacy cell reselection priority received in SIB, FFS when only legacy priority received in RRCRelease;

* 5: RAN2 confirm that if the UE is configured with slice specific frequency priority via RRCRelease message, the UE shall ignore all the slice specific priorities provided in system information. FFS if we still apply the legacy cell reselection frequency priorities in SIB.
* 6: The legacy procedure (i.e., UE first enters any cell selection state and performs cell selection) should be reused when the UE cannot find a suitable cell using any cell reselection priorities (including slice-based and legacy (non-slice based) priorities) if the UE is configured with slice based dedicated priority.
* 7: Inter-RAT frequencies are not configured with slice specific frequency priority, but inter-RAT frequencies can be considered using legacy cell reselection frequency priority after all NR frequencies that support any slice/slice group.
* 8: The slice specific cell reselection information provided by the network in SIB is slice group specific.
* 10: Reuse the legacy T320 timer for slice specific frequency priority in RRCRelease.
* 11: RAN sharing can be supported for slice based cell reselection and RACH by network implementation (e.g. dedicated priorities in RRCRelease). We don't define PLMN-specific reselection priorities or RACH configuration. FFS if we need something extra in RACH (may not be critical to WI completion).
* 3: FFS a frequency can be sorted multiple times (7/18) or only once (2/18) or it is up to UE implementation (5/18). Can discuss this further offline (244) (Lenovo) based on the consequences of each decision (including TPs).
* 9: The slice group specific cell reselection information can be provided by the network in RRCRelease.
* 15: PCI list per slice group per frequency can be provided in system information.
* 15.1: Network can indicate whether the PCI list is block-list (“cells not supporting the corresponding slice group”) or allow-list (“cells supporting the corresponding slice group”).

Slice based RACH

Agreeable proposals:

* 1. Not support the slice-based dedicated RACH resources and RACH prioritization parameters in the dedicated signalling.
* 2. RAN2 confirms that RA prioritization and RA partitioning work independently. Can discuss in the next meeting if this requires some configuration changes.
* 3. Deprioritize the RRC re-establishment triggered RACH in slice-based RACH design.
* 4. Reuse the same rule as the legacy in preamble group selection for slice-based RACH, i.e. if the preamble group has been selected during the RA procedure, the UE shall select the same preamble group for each RACH attempt (can be revisited in the common session if necessary).
* 6. Not to introduce the slice-specific max number of MsgA preamble transmissions for the slice-based RA fallback.
* 7. In one BWP, one slice group links to only one slice-specific RACH configuration.
* 11. The indication (i.e. whether slice override MCS, MPS or MPS override slice is common for all slice groups) is put under the IE BWP-UplinkCommon.
* 8. The UE AS is aware of the slice group ID (s) based on the information provided by the UE NAS.
* 9. It is left to the network implementation on how to signal the order of slice-based RA-prioritization parameters.
* 10. The maximum number of RA-prioritization configurations (i.e. maxSliceInfo-r17) is decided in the next meeting.
* Working agreement: RAN2 assumes that the mapping of slice to the slice groups for cell reselection are per TA.
* Send LS to SA2 to indicate the RAN2 working agreement above.
* 13. A slice is not associated with multiple slice groups for the same purpose. A slice can be associated with one slice group for RACH and one slice group for reselection.

## **RAN2#116b-e agreements**

Slice based cell reselection

* Working assumption: We go with proposal A without formula, e.g. as proposed by Samsung or Apple. Exact details to be worked out for the next meeting.
* No change to previous agreement that there can be different slice groups for RACH and reselection. Align with SA2 (if they tell us differently).
* 2.1: Among multiple TAs in the same RA, RAN2’s understanding is that the configuration on slice grouping should be homogeneous.
* 2.2: RAN2 assumes that for purpose of UE checking supported slices on the highest ranked cell at TA/RA boundary, gNB can provide in SIB the slice group that supported by these neighbour cells. If this conflicts with SA2, RAN2 will align with SA2.

FFS if the slice group is mapped by the mapping relationship in current RA or not.

FFS PCI list and/or TAC per slice group are provided.

FFS what is the UE behaviour if gNB doesn’t provide supported slice group info on the best ranked cell.

Slice based RACH

No papers were treated.

UE capabilities

No papers were treated.

## **RAN2#116-e agreements**

Slice based cell reselection

[R2-2110645](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116-e/Docs/R2-2110645.zip) [Post115-e][245][Slicing] Running NR RRC CR for RAN slicing (Huawei) Huawei discussion Rel-17 NR\_slice-Core Late

* P2-5 covered by meeting discussions, P1 can be discussed as part of RRC running CR post-meeting discussion.
* 1: A serving cell can provide slice support of neighbour cells.
* Best cell principle for intra-frequency cell reselection should be maintained i.e. UE camps on the strongest cell according to existing cell reselection rules.
* Network broadcasts slice info for the purpose of inter-frequency reselection. This will also need slicing priority for the serving frequency. FFS in which SIB.
* RAN4 is not in the scope of the WI

[R2-2110699](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116-e/Docs/R2-2110699.zip) Slice-based cell re-selection algorithm Ericsson discussion Rel-17 NR\_slice-Core

* There is suppport to go with this approach.
* Offline discussion [241] (Ericsson) to sort out the details of this solution. If no problems are found, we adopt this approach in the running CR. We try to decide in 2nd week CB session.

[R2-2111268](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116-e/Docs/R2-2111268.zip) [draft] Reply LS on Slice list and priority information for cell reselection CMCC LS out 8.8.1 Rel-17 NR\_Slice-Core SA2 SA2, RAN3 CT1 Late

* Offline discussion [240] (CMCC) to discuss reply to SA2. Should try to identify open points and find consensus (if possible). Discuss in two phases: 1st week for views, 2nd week for LS details.
* 1: A network slice can be associated to none or only one slice group.
* 3: Working assumption: The granularities of the slice groups for cell reselection are per TA. FFS on the details (e.g. how to resolve TA boundaries).
* 4: It is up to SA2/CT1 whether to consider the slice registration status. From RAN2 perspective, both registered slices and not yet registered slices can be considered for the slice priority.
* Remove "one type of" and use "RAN2 aims to use slice groups for both cell reselection and slice based RACH"
* Use " RAN2 understanding is that the granularities of the slice groups are per TA but RAN2 details are FFS."
* With the above change, the LS content is agreed
* Revised in [R2-211310](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116-e/Docs/R2-211310%20.zip)  (use RAN2 as source, remove "[Draft]" from title)

Slice based RACH

* 1 RAN2 agrees there are no issues to be solved w.r.t. “Cell- vs. UE specific slice group signalling” in standards
* Proposal 2 The solution for how the nw operator configures the following (CN and/or RAN OAM):

- mapping of slices to slice groups, sent from CN to UE in NAS signalling

- broadcast of slice group and its slice specific RACH configuration in SIB.

Potential NGAP impact is left for SA2/RAN3 to discuss.

* No LS sent to SA2/RAN3. Companies can raise relevant aspects directly in those groups.
* 4 RAN2 will use the following assumptions on slice groups and slice-specific RACH configuration in the work on Stage 3 details:
* 1. For slice-specific cell re-selection, cell reselection priorities for one or multiple slice group for the serving frequency are indicated in SIB of the serving cell.
* 2. Slice to slice-group configuration is common to cell reselection and RACH. Configuration of whether to use slice-specific cell re-selection or slice-specific RACH is up to network configuration (i.e. some slice groups may use cell reselection but not RACH, some may use RACH but not cell reselection, some may use both).
* 3. In a cell, there may be multiple slice-specific RACH configurations.
* 4. One or more of the slice groups are linked to a slice-specific RACH configuration.
* 5. There may be slice groups that are not linked to a slice-specific RACH configuration (they use the common RACH configuration).
* 6. All slices of a slice group use the slice-specific RACH configuration of the slice group.
* 1: RAN2 confirm the following understanding and send LS to RAN3, SA2 and CT1 to indicate it:

1) Mapping between slice and slice group should be consistent between serving gNB and UE, in order to avoid misunderstanding of system information.

2) Mapping between slice and slice group can be consistent within the same TA.

* FFS if there are other aspects to consider for TA boundaries. Can discuss those in [240] if time allows.
* 2: The indication for whether slice override MCS, MPS or MPS override slice is common for all slice groups.
* 3: RACH prioritization parameters can be configured per slice group.

UE capability

* As baseline, consider the following capabilities. FFS on details, can consider changes in the next meeting.
* #1: UE indicates its support of slice based cell reselection in the UE capability signalling with the following TS38.306 description.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Definitions for parameters | Per | M | FDD-TDD DIFF | FR1-FR2 DIFF |
| ***sliceInfoforCellReselection-r17***Indicates whether the UE supports sliceInformation on RRC release for slice based cell reselection in RRC \_IDLE and RRC INACTIVE as defined in TS 38.304 [21]. | UE | No | No | No |

* #2: Since slice based RACH is only applicable for UE in RRC IDLE and RRC INACTIVE, there is no need for explicit capability to inform network and should just be “Optional without UE capability” as follow under Section 5.4 Other features:

|  |
| --- |
| **Definitions for feature** |
| **Slice based random access** It is optional for UE to support slice based random access as specified in TS 38.321 [8]. |

## **RAN2#115-e agreements**

Slice based cell reselection

Agreements

* RAN2 needs to check with SA2/ CT1 if it is alright for AS to expect to receive slice list as well as slice priority information from NAS for cell (re)selection. Ask about both slices and slice groups.

Agreements

* 2 Following is taken as the baseline for Solution Option 4:

The “slice info” (for a single slice or slice group) agreed to be provided to the UE in the last RAN2 meeting using both broadcast and dedicated signaling are provided for the serving as well as neighboring frequencies. The following steps are used for slice based cell (re)selection in AS:

Step 0: NAS layer at UE provides slice information to AS layer at UE, including slice priorities.

Step 1: AS sorts slices in priority order starting with highest priority slice.

Step 2: Select slices in priority order starting with the highest priority slice.

Step 3: For the selected slice assign priority to frequencies received from network.

Step 4: Starting with the highest priority frequency, perform measurements (same as legacy).

Step 5: If the highest ranked cell is suitable (as defined in 38.304) and supports the selected slice in step 2 then camp on the cell and exit this sequence of operation; FFS: How the UE determines whether the highest ranked cell supports the selected slice.

Step 6: If there are remaining frequencies then go back to step 4.

Step 7: FFS: If the end of the slice list has not been reached go back to step 2.

Step 8: Perform legacy cell reselection.

* 1: Solution Option 4 is selected for further work i.e., resolve the FFSs, send any required LSs and consequently start to draft specification CRs.
* Other solutions can be discussed based on company contributions (with technical analysis) next time.
* After online session, it was noted that the solution 4 FFSs were not resolved. Email discussion is assigned to try to tackle those (as they may involve LS to RAN4).

R2-2108928 LS on Slice list and priority information for cell reselection RAN2 LS out Rel-17 NR\_Slice-Core To: SA2, CT1 Cc: SA1

* The above LS was approved after email discussion “[Post115-e][241][Slicing] Slice list and priority information for cell reselection (Lenovo)”.

Slice based RACH

Bulk agreements

* 3 Network based solution is introduced to resolve the issue of prioritization parameter collision with MPS/MCS, i.e., Network indicates whether slice override MPS or MPS override slice.
* 5 For slice based RACH prioritization, RAN2 will stick to the current baseline parameters, i.e., scalingFactorBI and powerRampingStepHighPriority, and no additional parameters for this release.
* 7 Reuse the legacy threshold for the selection between 2-step and 4-step slice initiated RACH
* 1 A new slice grouping mechanism is introduced for RACH configuration. One slice belongs to one and only one slice group. Slice groups are assumed to be only updated when UE does Registration Update.
* 2 Working assumption: The mapping between S-NSSAIs and slice groups should be configured to the UE through NAS signalling. Discuss problems for cell- vs. UE-specific signalling via post-meeting email discussion.
* 4 If no network indication is sent in case of slice prioritization parameter collision with MPS/MCS, it will be left to UE implementation.
* 8 It is RAN2 common understanding that 4-step common RACH needs to always be supported in initial BWP for legacy UE. And whether to configure 2-step slice specific RACH only or 4-step slice specific RACH only or both is left to network configuration.

*6 For RACH type selection, UE first selects between slice-specific and common RACH, then selects between 2-step and 4-step.*

*9 The following fallback case is supported:*

*– Fallback case 2: Fallback from 2-step slice specific RACH to 4-step common RACH, if 4-step slice specific RACH is not configured.*

*10 The following fallback cases are not supported in this release:*

*– Fallback case 1: Fallback from 4-step slice specific RACH to 4-step common RACH*

*– Fallback case 3: Fallback from 2-step slice specific RACH to 2-step common RACH, if neither 4-step slice specific RACH nor 4-step common RACH is configured.*

* 6, 9, 10 will be aligned to the common RACH partitioning discussion decisions

## **RAN2#114-e agreements**

Slice based cell reselection

**1: Frequency priority mapping for each slice (slice -> frequency(ies) -> absolute priority of each of the frequency) is provided to a UE.**

**Note: Signaling optimizations are not excluded.**

**Note: "slice may also mean "slice group"**

**1b: Frequency priority mapping for each of the slice (slice -> frequency(ies) -> absolute priority of each of the frequency) is part of the “slice info” agreed to be provided to the UE using both broadcast and dedicated signaling.**

**2: RAN2 kindly allow one more meeting cycle for understanding the necessity of Slice priority along with the following shortlisted solution directions for Idle mode mobility:**

**a) Option 4): Slice priority first looping over slice-frequency combination**

**b) Option 5): Maximize slice support**

**c) Option 6): Frequency priority of highest priority slice with adjustment based on actually supported slice(s) in best ranked cell, without multiple iterations of cell reselection**

**d) Option 7): Perform legacy cell reselection mechanism based on slice specific frequency priority**

**3: RAN2 consider a scenario in its work for slice specific cell (re)selection where it is possible that (Suitable) cells on the same frequency belonging to different TAs support different Slice(s).**

* 4: Working assumption: The Best cell principle according to absolute priority reselection criteria specified in clause 5.2.4.5 of TS38.304 needs to be met also for slice specific cell (re)selection.

**6: In addition to proposal 2, following aspects are FFS:**

**a) Content of “Slice Info” – to what extent the information needs to be and should be provided to support the Principle in proposal 5**

**b) If used, who provides the “Slice priority” (NAS/ AS, UE/ Network)**

**c) Can RAN2 continue to use “intended” slice for initial registration and idle-mode mobility**

**d) How UE in each of the solutions from proposal 2 uses slice info for cell reselection if both slice info and existing cell reselection priority is signaled (in the SIB and/ or dedicated signaling)**

Slice based RACH

* 4: RAN2 confirm for a slice group, separated RO and/or separate preamble can be configured within the existing RACH-ConfigCommon and RACH-ConfigCommonTwoStepRA
* 5: Same as NR Rel-15 conclusion, RAN2 conclude that there is no RA-RNTI collision between slice specific RACH and legacy RACH in shared RO
* 6: Same as NR Rel-15 conclusion, RAN2 conclude that the RA-RNTI collision between slice specific RACH and legacy RACH may happen in separate RO.
* Working assumption: this can be left to network implementation to resolve it (e.g. network configure RO in different time)
* FFS how many slice groups we can have and how they are indicated.

## **RAN2#113b-e agreements**

Slice based cell reselection

Agreements

1 RAN2 aligns with SA2 assumption that support of slices in a TA is homogenous also for Rel-17 (i.e. all cells within a TA supports the same slice availability). If SA2 decides to support heterogeneous deployments, RAN2 can revisit this.

2 The criteria for determining the cell reselection priority for inter-frequency cell reselection should not be left to UE implementation, but should be defined in the specification (just like cell reselection priorities currently). The details of slice info and how the UE determines its priority list from slice info is FFS.

2b FFS how to define slice priorities for reselection and how to handle conflicts between different priorities (e.g. broadcast vs. dedicated slice-specific priorities)

5 UE is only configured with either the existing dedicated priority configuration or the slice info in RRC Release.

3 In the case that slice info is also provided to the UE in the RRC Release message while SIB also provides the slice info, UE follows the dedicated slice info from RRC Release while T320-like timer is running and only if it expires that it follows the slice info in the SIB

4 In the case that existing dedicated priority configuration is provided to the UE in the RRC Release message while SIB also provides the slice info, UE follows the dedicated priority configuration while T320 is running as per legacy and only if it expires that it follows the slice info in the SIB

6 For UE supporting slice based cell reselection, the UE should use slice info in the SIB for cell reselection if both slice info and existing cell reselection priority is broadcast in the SIB.

* 1: With regard the main solution for prioritisation for slice based cell reselection, the following topics to be the initial focus for discussion: Details of slice availability in terms of Slice grouping and frequency priority information for broadcast and RRC Release message, usage of “intended slice” (FFS whether we use this term in specification), UE prioritisation of slice when there is more than one intended slice and how UE determines frequency priority for inter-frequency cell reselection based on these.
* 2: Following topics are only considered after some progress on the main solution for prioritisation for slice based cell reselection: which SIB(s) to carry slice availability, whether an LS to SA3 is needed (if SST/SD is agreed for slice info), whether SIB segmentation/on-demand is required (if new SIB is defined).
* 3: Other topics that have some support and could be discussed further depending on companies providing more details on the motivation and level of support: slice based reselection for MO, different RSRP/RSRQ thresholds for inter and intra-frequency slice based cell reselection, need for Validity area in RRC Release

Slice based RACH

Agreements

1 RAN2 aims to support both RO partition and preambles partition.

2 scalingFactorBI and powerRampingStepHighPriority can be configured at least in SIB (FFS for dedicated RRC signalling).

3 Network can configure slices with 4-step or 2-step (or both) RA resources.

4 Legacy 2-step RA fallback mechanism is supported.

* 2: RAN2 will prioritize the discussion for slice specific RACH for IDLE and INACTIVE mode. And CONNECTED mode is down prioritized and can be considered if time allows.
* 3: Slice specific RACH (including RACH isolation and RACH prioritization) is only applied for CBRA but not for CFRA.
* 4: To ensure the backward compatibility, it is RAN2’s common understanding that common RACH resource should be configured in initial BWP if the slice specific RACH resource is configured in initial BWP.
* 6: RAN2 confirms that the issue of prioritization parameter collision with MPS/MCS need to be resolved. There is UE based solution (option 1, fixed rule) or network based solution (option 2, configurable rule) or both. Discussion on pros and cons can be left to next meeting.
* 5.1: RACH type selection between 2-step slice specific RACH and 4-step slice specific RACH is based on a RSRP threshold.
* FFS to introduce a slice specific threshold or reuse the legacy threshold.
* FFS UE should first select between slice specific RA and common RA or UE should first select RA type between 2-step RA and 4-step RA
* 5.2: The table from [R2-2104322](http://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113bis-e/Docs/R2-2104322.zip) can be used for further discussion.
* Slice specific RACH is only applicable if there is slice information (e.g., slice group or slice related operator defined access category) available for AS layer when access. FFS on details of slice group.